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EDISON ELECTRIC INSTITUTE BULLETIN

NOVEMBER, 1936

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EDISON ELECTRIC INSTITUTE

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled Monthly by the Edison Electric Institute—Covers 100% of the Industry

DURING THE MONTH OF SEPTEMBER

	1936	1935	%
Kilowatt-hours Generated* (net)			
By Fuel	6,424,733,000	4,935,575,000	+30.2
By Water Power	2,743,087,000	2,718,792,000	+ 0.9
Total Kilowatt-hours Generated	9,167,820,000	7,654,367,000	+19.8
Additions to Supply			
Energy Purchased from Other Sources	143,472,000	203,421,000	−29.5
Net International Imports	98,891,000	89,190,000	+10.9
Total	242,363,000	292,611,000	−17.2
Deductions from Supply			
Energy Used in Electric Railway Departments	40,572,000	40,729,000	− 0.4
Energy Used in Electric and Other Departments	106,766,000	110,827,000	− 3.7
Total	147,338,000	151,556,000	− 2.8
Total Energy for Distribution	**9,262,845,000**	**7,795,422,000**	**+18.8**
Energy Lost in Transmission, Distribution, Etc.	**1,352,613,000**	**1,160,616,000**	**+16.5**
Kilowatt-hours Sold to Ultimate Consumers	**7,910,232,000**	**6,634,806,000**	**+19.2**
Sales to Ultimate Consumers (kwhrs)			
Domestic Service	1,261,410,000	1,134,783,000	+11.2
Commercial—Small Light and Power (Retail)	1,402,087,000	1,192,068,000	+17.6
Commercial—Large Light and Power (Wholesale)	4,539,501,000	3,676,127,000	+23.5
Municipal Street Lighting	196,710,000	188,960,000	+ 4.1
Railroads—Street and Interurban	338,091,000	327,860,000	+ 3.1
Railroads—Electrified Steam	99,363,000	67,200,000	+47.9
Municipal and Miscellaneous	73,070,000	47,808,000	+52.8
Total Sales to Ultimate Consumers	7,910,232,000	6,634,806,000	+19.2
Total Revenue from Ultimate Consumers	$175,596,900	$159,072,800	+10.4

DURING TWELVE MONTHS ENDING SEPTEMBER 30th

Kilowatt-hours Generated* (net)			
By Fuel	66,203,250,000	53,139,636,000	+24.6
By Water Power	36,132,087,000	36,245,599,000	− 0.3
Total Kilowatt-hours Generated	102,335,337,000	89,385,235,000	+14.5
Purchased Energy (net)	2,986,041,000	2,982,516,000	+ 0.1
Energy Used in Electric Railway and Other Departments	1,937,178,000	1,970,381,000	− 1.7
Total Energy for Distribution	**103,384,200,000**	**90,397,370,000**	**+14.4**
Energy Lost in Transmission, Distribution, Etc.	**16,843,762,000**	**15,518,528,000**	**+ 8.5**
Kilowatt-hours Sold to Ultimate Consumers	**86,540,438,000**	**74,878,842,000**	**+15.6**
Total Revenue from Ultimate Consumers	**$2,028,226,900**	**$1,895,558,600**	**+ 7.0**
Important Factors			
Percent of Energy Generated by Water Power	35.3%	40.5%	
Domestic Service (Residential Use)			
Average Annual Consumption per Customer (kwhr)	709	660	+ 7.4
Average Revenue per kwhr (Cents)	4.80¢	5.13¢	− 6.4
Average Monthly Bill per Domestic Customer	$2.84	$2.82	+ 0.7

BASIC INFORMATION AS OF SEPTEMBER 30th

Generating Capacity (kw)—Steam	24,078,400	23,705,400	
—Water Power	9,012,900	8,956,800	
—Internal Combustion	500,000	500,000	
Total Generating Capacity in Kilowatts**	33,591,300	33,162,200	
Number of Customers			
Farms in Eastern Area (Included with Domestic)	(650,238)	(562,079)	
Farms in Western Area (Included with Commercial—Large)	(238,914)	(215,838)	
Domestic Service	21,561,465	20,897,743	
Commercial—Small Light and Power	3,797,185	3,767,932	
Commercial—Large Light and Power	516,177	514,580	
Other Ultimate Consumers	62,928	67,574	
Total Ultimate Consumers	25,937,755	25,247,829	

* By courtesy of the Federal Power Commission, with deductions for certain plants not considered electric light and power enterprises.
** Old Series both years—subject to revision to agree with data contained in Statistical Bulletin No. 3.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume IV NOVEMBER, 1936 No. 11

The Answer—Intensive Selling

Sales Committee Plans Banner Commercial Year

By C. E. Greenwood

Commercial Director, Edison Electric Institute

THE interest and anxieties of the Presidential election are over. Whether we cashed in or paid out on election debts, we can now settle down and adjust to circumstances. Our utility industry has had to cope with far more than its share of punitive and restrictive Government measures, but nevertheless the industry has been forging ahead with a fighting, yet constructive spirit. The exaction of discriminatory taxes, the cost of surmounting obstacles placed in the way of utility managements by Federal, State and Municipal sources with resultant increased costs of doing business are still with us. Unhappily the contributions of nation-wide, favorable publicity for the electric utility industry through Federal advocation of the need of greater use of electricity in the home is nullified by the addition of these burdensome expenses to cost of private operation.

Normally such action would retard rate reductions which encourage use to a greater degree and enhance the value of electric services. They are not always in the security holder's interest. BUT what has happened?

The utilities have reduced rates in the face of oppressive measures affecting them, and buckled down to more intensive commercial operations as the best, if not the only way out. For the past few years the industry has sustained an aggressive selling position, in unanimity of action, as the only solution to bring about a happier and healthier industry. The commercial forces through the Edison Electric Institute have been stepping up the pace each year.

One, sitting through the last session of the Sales Committee of E.E.I. on October 9, at New York City, would have been impressed with the organization, and the effective action indicated in the reports on the status of nationally prepared programs, and the plans presented by committee chairmen covering the scope of their activity for the coming year. A brief summary is the most that can be covered in this outline.

In lining up the *Sales Committee* for the organizational year, Chairman D. M. DeBard decided upon the appointment of three Vice-Chairmen and five new committees. The Vice-Chairmen are M. E. Skinner, Buffalo; H. F. Smiddy, New York, and G. E. Whitwell, Philadelphia.

Committees on Electric Refrigeration, Electric Cooking and Electric Water Heating will function in coordination with the Kitchen Modernizing Bureau under Mr. Whitwell, and plan to carry through programs which will supplement the promotional work on this type of equipment in the Bureau program, similar to the Lighting Sales Committee in connection with the Better Light-Better Sight Bureau.

Women's activities will be represented in the appointment of a committee on Household Economics with Miss Florence Freer of Brooklyn as Chairman, and C. L. Harold of Brooklyn will head a committee on Finance. The exact scope of activity of these new committees has not been determined on account of the delayed appointment.

If present plans are adopted the *Water Heating Committee* under the leadership of Kinsey M. Robinson, Boise, will carry on in conjunction with the Water Heating Division of NEMA an intensive program of publicity on electric water heating service. Mr. Robinson is president of the Idaho Power Company, one that has been a leader in the development of this class of service, has spoken before several groups this fall, and is giving liberally of his time to forward electric water heating promotion nationally. It is recognized that we are on the threshold of public acceptance of the water heater, and the service story will be presented to editors of leading women's magazines in a human interest way. Contacts will be maintained through an advertising agency. Of course a method of coordination by the utilities will be worked out so that those concerned will capitalize on the public interest created. It is also understood that the local utilities will conduct local advertising campaigns on electric water heating service through at least two months in 1937. A prize competition for superior accomplishments in this field is proposed.

The *Refrigeration Committee* under A. A. Brown of Oklahoma City will coordinate with the Kitchen Modernizing Bureau, conducting a planned activity to create in the public mind the excellence of refrigerating the electrical way as compared to the use of other means. The committee is fully aware of the keen competition that is facing the industry and is now engaged in working out the details.

The *Electric Range Committee* under H. P. Megargee of New York has in mind the development of syndicated promotional material for utility use together with newspaper mats, releases, and out-

door posters. A later issue of the BULLETIN will carry a more specific outline of scheduled activities on these major load builders. The most that can be done here is to indicate the trend of thought coming out of the discussions of the Sales Committee.

Financing—In the past two or three years there has been widespread attention given by banking sources to the financing of kitchen equipment. In addition to the financing arrangements offered by the investment bankers, we find leading national banks of the country ready to purchase the deferred payment paper of the utilities. Rates for this class of financing have been lowered.

We look back but a few years to a time when the financing of electric kitchen equipment by the utility companies, for a term of longer than eighteen months, was a thorn in the side of the average dealer unless there was some arrangement where he could share the same advantage. Certain groups were moved to reprisal by influencing attempted legislation to prevent the utility from continuing in the merchandising business. TVA through its formation of EHFA, jumped to three-year terms for the financing of one electrical item and four years for the purchase of two. This was an innovation which made utility terms appear conservative indeed. The entrance of the Federal Housing Administration into the insurance of banking concerns which offered lower financing rates than had prevailed previous to the National Housing Act becoming effective, created a new basis of judgment on what might be termed sound financing. The Electric Home and Farm Authority has now adjusted to the old Federal Housing terms, and we have private companies that are offering even lower rates for instalment purchases.

The *Finance Committee* under Chairman Harold will survey the field and prepare a report on these numerous financing plans and present information relative to their application and effectiveness.

Household Economics—In much of the promotional work of the Institute the Home Service Departments of utility companies and of the manufacturers are called upon to familiarize themselves with promotional details and their effective promulgation. There can be no group more interested, and none more fitted to carry to the homes of consumers the message of Kitchen Modernizing, Better Light for seeing, and the advantages of Electric Table Cookery. It is believed that this committee, under Miss Freer, formed to actively carry forward such work, is a necessary and helpful adjunct to commercial promotion.

Rural Sales—A reading of the last issue of *Rural Electrification Exchange,* a publication of the Rural Sales Committee, was informative on the trend of utility activity in rural line development. There will probably be 150,000 customers in rural territory connected this year, 100,000 of which will be on new line extensions. When the farmer is connected, it is then the concern of the Commercial Department to see that his purchases of electrical equipment are such as to make him happy with the convenience and help that he receives from electricity as a servant. His investment in apparatus should be made economically sound also, and the rural customer should be developed as early as possible into a profit-maker for the company. This is a job that is gaining the attention of utility men because the investment is high per customer as extensions go into sparsely settled territory, and the customer has limited means with which to purchase needed equipment for his farm and farmstead. The *Rural Sales Committee* under R. K. Derry will confine its attention to the ways and means of developing this class of customer.

Air Conditioning—With the growing demand for air conditioning in commerce and industry, and with the determination of the utility companies to pioneer and aggressively promote air conditioning in the domestic field, the next few years promise to be important ones in the advancement of this service. There are the technical phases of this subject that require closest attention because of the needs of the purchaser of the service, and because of the importance of obtaining equipment which will meet the demands made upon it to deliver that service. Again, engineering emphasis has been given so much attention by leading manufacturers that a study of the methods of selling air conditioning has been too long delayed. Granting that many companies have done a fair job, we are only beginning to get organized with men and knowledge to adequately promote air conditioning service which will positively win new friends by its performance.

Therefore Chairman DeBard decided upon separate committees to give attention to each phase of the study, E. A. Freund of St. Louis to guide the Equipment Division and W. G. Moore of Dallas to head the committee on Promotional Activity. J. E. Davidson, president of Nebraska Power Company, Omaha, has been prevailed upon to act as Coordinator and give the weight of importance this subject deserves.

Last year's committee prepared a comprehensive report which is being distributed this month. It also drew up a form for reporting statistical data on present and future installations of air conditioning. The value of Quarterly Statistical Reports as an indication of the growth of the air conditioning industry, and the contribution it is making to business is fully realized, and is being arranged. Report blanks have been widely distributed among utility companies. It is hoped that not only will the utility unite with dealers and manufacturers locally in selling air conditioning, but that they will keep records in uniform manner, and send them to Institute Headquarters which will act as a source of such information for the many inquiries that are received from the trades.

Kitchen Modernizing Bureau — On November first the National Kitchen Modernizing Bureau completed its first year of activity. Although the first months were given to organizing the movement, and for preparation, a reading of the achievements for the year are most gratifying. One field man has worked for the entire year, and two others a part of the year. Communities in 24 states have been visited and 49 local Bureaus have been organized as a result. Naturally a promotional activity of this kind, so broadly cooperative, and one having a more general background than others which have sold a specific service in the past, must be able to sell its value within the industry. The annual report of Chairman G. E. Whitwell is voluminous and it is full of information on service rendered and profitable results obtained.

Recognition of the demonstrated value of the Kitchen Modernizing movement to electrical equipment manufacturers, utilities, and likewise to manufacturers of accessories, was recorded at the last meeting of the Executive Committee of the Bureau on September 15, when an increase of 50 per cent in the promotional fund was voted by the NEMA contributors for 1937. The field force is to be increased and new types of publicity media will be prepared and distributed. These will include radio transcriptions, sound slide films, newspaper mats, re-

leases for newspapers and the trade press, magazine articles and the like, together with booklets on Kitchen Planning, a Meal Book and perhaps a contest feature.

The objectives of the Kitchen Modernizing Program are to assure expenditures in the family budget for electric kitchen equipment; to make the kitchen an efficient and attractive workshop thereby enhancing the value of electric service in the home and improving the value of real estate, and to set a style in building future homes and apartments by making a planned kitchen the only modern one.

As Chairman Whitwell has stated, although the electric range, water heater, refrigerator and dishwasher, with such small appliances as the mixer, roaster and such, can be wrapped up into a marketable commodity, it is not expected that we can have volume selling of the complete kitchen. It is generally a step by step process in which the purchaser of any one or two units is thinking and planning this apparatus as a part of a coordinated whole.

This will be the background for intensive selling of the individual items such as an electric refrigerator, range and water heater which, as previously explained, will be given attention in supplemental activities coordinated with the Bureau program under Chairman Whitwell.

The report of the *Better Light-Better Sight Bureau* under leadership of M. E. Skinner, Buffalo, has been printed and distributed to utility commercial executives in addition to all members of the Sales Committee, and therefore Mr. Skinner stated at the Sales Committee meeting that he would outline but a few of the highlights, particularly expectations of the future. The concentrations in the promotion of Light for Seeing in the home have been sustained and highly successful. The purpose of the Bureau now is to spread the Better Light-Better Sight doctrine more aggressively into commercial and industrial fields, into the schools and on the highways.

In connection with home-lighting, a high spot for the past year has been the remarkable development in the Better Sight portable lamps built to IES specifications and selling by many thousands from coast to coast. A special campaign for October was set up with an appropriation approximating $85,000 for advertising in leading national magazines. This joint fund was raised by the incandescent lamp, and the portable lamp manufacturers. The goal was one million lamps for October.

Utilities have spent liberally either in local advertising and selling or general promotion of these lamps through dealers in direct tie-in with this special IES lamp feature of the Better Sight Program. Although factories were humming night and day the problem of all outlets was not sales but deliveries. The next step is to make equal improvement in household lighting fixtures as in portable lamps.

There has been some discouragement on the part of optical manufacturers and jobbers in the distribution of "Light Prescribing" equipment. The profit on sales does not justify aggressive promotional expense, with the result that the Bureau hopes to interest utilities in pushing the apparatus for the Light Prescribing Technique feature among 30,000 practitioners in the optical field. It has the full endorsement and cooperation of the Better Vision Institute.

A study is being made by the Bureau to indicate the return on the investment through lighting service activity in the home. More persons are required now to make the many thousand contacts that are essential, but the selling of Better Light-Better Sight should bring about a greater use of electricity for lighting purposes which will justify the additional promotional cost.

The movement for better highway lighting is growing. More and more good lighting demonstrations are being made in sections and spots known to be most hazardous for night driving. Apparently the time is not right as yet for national promotion but some utilities are showing increasing interest, particularly in demonstrations. If only bad spots on highways proven especially hazardous were to be well lighted, considerable revenue would be gained and many lives saved. A very large percentage of utilities have built or have under way lines extending far out into rural sections so that much of new highway lighting would not require complete line extensions.

Mr. Skinner emphasized that there would be closer coordination of the major industries connected with the program. Some of the associations that endorsed the movement had not been as active as the Executive Committee desires. However an increasing interest is being shown, more and more medical men are listening to the story. Close contact is being maintained and the Bureau is assured that participation of other associations will be more effective in the coming year.

Electrical Housewares—"The third concentration this year in the Electrical Housewares Program," said H. P. J. Steinmetz, chairman," is getting the most popular reaction aside from National Electrical Housewares Week. This month of October is Electric Buffet Service Month. The idea of buffet entertainment is a popular one and the tie-in with General Foods Corporation has brought new interest into the picture to help us promote the table cookery group of appliances."

By reason of causes beyond the control of the committee, Electrical Housewares Month and Electrical Wedding Month were delayed in preparation. These were normally successful. There is no doubt about wide interest in Electric Buffet Service Month. All Commercial executives have been kept informed and urged to cooperate. Thirty-five thousand posters have been distributed. The dealer list of *Electrical Merchandising* was used together with the manufacturer and utility distribution.

As usual, there is a display contest for window or interior store display. In addition to the prizes in each dealer class the committee offered a special $100.00 prize to the wholesaler who entered the greatest number of his dealers in the National Contest.

Besides the announcements of General Foods on its Maxwell House Coffee and Log Cabin Syrup programs, a full page appeared in their Fall Plan Book, and all the grocers were urged to display electrical devices for Buffet Service entertaining in connection with special food products adapted to such use.

The Housewares Committee has received unusual publicity in other trade papers such as *Retailing, House Furnishing Review, Electrical Manufacturing, Printers Ink* and there is a two-page article on electric table devices for Buffet Entertaining in the November issue of *American Home*. Two newspaper releases a week have been sent to newspapers in the larger cities.

Publicity and promotion for the Second National Electrical Housewares Week—December 7-12—is going forward. This was a big event last year when there was a demand for 80,000 posters, and with early publicity it is expected to greatly exceed the results

of last year. The Christmas poster for the December concentration is now being mailed to 30,000 utilities and dealers in the United States. This final campaign of the year will surpass in extent and in interest all previous effort.

The *Lighting Sales Committee,* under M. N. Waterman, in coordination with Better Light-Better Sight will prepare complete selling plans on store lighting, including suggestions for advertising, statistical data from successful installations, and experience data from communities where there has been unusual development in this field. It is also the purpose of this committee to provide the commercial executive with tested plans for addressing a market where human need is great, and where guidance can be beneficial to all. There will be case studies pointing out how central stations have performed the service of providing information to school physicians, teachers, parents and children. A similar study will be made of rural highway lighting including collection and correlation of data; the study of existing demonstrations and the relation of accidents to insufficient light on the highway.

Wiring—the proverbial bottleneck of all electric development—is still a subject for attention both from the technical and promotional angles. The Wiring Committee under J. D. Noyes of Detroit will later publish a report on the status of experimental developments in lower cost wiring and in range installations. Material now is being collected from several sources. Other subjects that are occupying the attention of the wiring committee are the code ordinance situation and the handicaps that surround more rapid development of adequate wiring. There will be wider distribution of this information.

Of outstanding interest is the practical completion of a Handbook of Interior Wiring Design. The initial steps in the development of these specifications was the appointment of a subcommittee headed by E. A. Brand of Buffalo, who organized a joint committee representing utilities, manufacturers, contractors, inspectors, wholesalers and other groups interested in wiring promotion. The task is completed and the Handbook, representing as it does the opinion of leading minds in the wiring field, will be one of the most valuable publications on the subject. Copies should be available for distribution in late December.

Commercial Sales will have more attention than usual this year. Lighting has its organized promotion, and the Commercial Sales Committee under the leadership of P. M. Alden of Philadelphia will stimulate new interest in sales of service in that class of customer lying between the residence and industrial groups up to a nominal maximum of 25 hp. The committee will act as a clearing house for items of interest relative to load-building activities in this field, which will include advertising programs, sales campaigns and new applications. A study will be made of competition in this small commercial field.

It is recognized that we have not yet tapped the possibilities in electric cooking equipment, especially that used on the counter and pantry. Then we have commercial water heating, commercial refrigeration, ventilation and specialty applications. There can be no question that this committee will bring forcibly to the attention of the industry a realization of the load-building opportunities in a field which is recognized has rich potential possibilities.

An active *Industrial Power and Heating Committee* under the leadership of H. C. Webb, Jr., of Richmond, has been making such painstaking studies in the power field that much might be written here on the status of sales development. It is recognized that competition is keen. In some instances it is a competition with which it is difficult to cope. The power salesman must be ever on the alert, keen and accurate in his study of his customer or prospect. He merits the attention and support of his executive. The power salesman in recent years has seen much activity and interest in other classifications of business, with plenty of advertising to back up the sales forces.

The Power Committee has prepared a proposal for an advertising program in national media directed to the industrial executive, setting forth the advantages of Purchased Power. The basis of the proposal was the answers obtained from a widely distributed questionnaire on the needs of the industry in connection with power advertising. A special committee has been appointed to take the subject under advisement, and determine on ways and means for carrying through such a program.

Another survey has produced helpful information on electric melting furnaces. There were 762 furnaces involved in the survey and 117 utility companies contacted. The purpose was to aid in the discussion of the profitable nature of the furnace load, arrive at an estimate of the investment necessary to serve such loads, rates charged for the service and average revenue return. It is recognized that there is a huge potential market for electric melting furnaces in all branches of the metals industry.

The commercial cooking load and oil refining and pumping are two services which will have specific attention, and reports will be prepared on both subjects. A renewed interest in commercial cooking applications was evidenced during a recent informal conference of thirty-odd utility representatives to discuss the features of this class of business and interchange ideas and experience in connection with sales development.

Which is a reminder that the success of the Power Conference last year merits repetition, and the Sales Committee has voted to hold the "Second Annual" in connection with the Annual Sales Conference in March.

An organized Sales Committee, with its several subsidiary committees enthusiastically active, its broad plans for research, development of selling programs and complete coordination with national activities in progress, will not fail to achieve the results Chairman De Bard anticipates in service to the industry.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of EDISON ELECTRIC INSTITUTE BULLETIN, published monthly at Philadelphia, Pa., for October 1, 1936.

State of New York.
County of New York.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Wilgar Coleman, who, having been duly sworn according to law, deposes and says that he is the Editor of the EDISON ELECTRIC INSTITUTE BULLETIN, and that the following is to the best of his knowledge and belief, a true statement of the ownership, management . . . etc., of the aforesaid publication for the date shown in the above caption, required by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations . . . to wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, EDISON ELECTRIC INSTITUTE, 420 Lexington Avenue, New York City; Editor, Wilgar Coleman, 420 Lexington Avenue, New York City; Managing Editor, none; Business Manager, none.

2. That the owners are EDISON ELECTRIC INSTITUTE, 420 Lexington Avenue, New York City, a mutual organization, not incorporated. Charles W. Kellogg, President, New York, N. Y.; F. H. Nickerson, Treasurer, New York, N. Y.; Bernard F. Weadock, Vice-President and Managing Director, New York, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: None.

WILGAR COLEMAN,
Editor.

Sworn to and subscribed before me this 17th day of Sept., 1936.

(Seal) JESSIE R. GERMOND,
Notary Public, New York County.
(My commission expires March 30, 1938.)

Industrial Power Sales and Advertising

By William H. Hodge

Manager, Sales and Advertising
Public Utility Engineering and Service Corp., Chicago, Ill.

Abstract of an Address before Eighth Annual Conference of the Petroleum Electric Power Club at Fort Worth, Texas, October 15, 1936

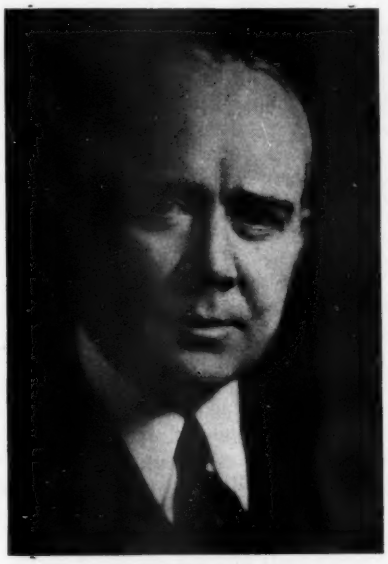
FROM a study of statistical information I would conclude that at least 30 per cent of the entire revenues of the electric light and power industry are derived from electricity supplied for industrial purposes—that is to say, electric power applied mechanically in manufacturing or other production and distribution, and excluding small motors in commercial establishments and residences, and power in transportation.

Domestic service provides about 37 per cent of the entire revenues; stores, office buildings and other commercial establishments — some with incidental manufacturing—perhaps 27 per cent of the whole, with the remainder—6 per cent—coming from street lighting, electric railways, electrified steam railroads and miscellaneous sources. These do not purport to be exact figures. They are as good approximations as I can make with the data available.

Now it is common knowledge to those who have studied the development of the electrical industry that the price of kilowatthours for household use was not cheapened to a point where it was within reach of the average family until central stations had learned how to produce, price and sell a considerable quantity of energy for industrial purposes. Neither was it possible to make attractive rates for commercial establishments. Both production and distribution costs were high and bound to stay high, unless large output volume and long hour use could be secured, and load factors highly improved, by the accession of industrial business.

In 1890 when the average cost of electricity for household use was 23 cents a kwhr there was practically no power business supplied by central stations; in 1900, when it was 17 cents, there was not much of it, but in the next ten years there were substantial gains and more than 7 cents was lopped off the average residential rate.

About 1910 the vast industrial possibilities inherent in large central station production, and long distance transmission so as to provide large markets, began to take form. There was a period in which hard, intensive salesmanship was imperatively utilized to introduce central station power into mills, factories, mines and oil fields, and in this the electrical equipment manufacturers had a helpful and prominent part.



MR. HODGE

In the hectic post-war decade isolated plants went out by the hundreds; purchased power went in. When the depression hit in 1929 it is safe to say that in many territories upwards of 90 per cent of all industrial operations, reasonably within the scope of central station power, utilized that form of power. This is still true. Probably in no large area is the minimum less than 65 per cent.

The big central stations, far-flung transmission systems and low unit costs of delivered energy for all purposes could not have been possible without this huge volume of industrial business. Meanwhile the average price of the household kilowatthour marched down hill from 9.62 cents in 1910 to 6.33 cents in 1929; to 5.03 cents in 1935. And the price of the commercial kilowatthour took a corresponding slide.

The fact that the industrial business requires from 55 per cent to 60 per cent of the total power plant production, and that the price of the average industrial kilowatthour is but 1.27 cents, does not mean that the household, commercial and farmer users are discriminated against. Quite the contrary. As perfectly well known to you—and unfortunately not so well known to the public—it is this very industrial power load that makes possible the low production, transmission and distribution costs, which are translated into kilowatthour unit rates much lower than would otherwise be possible in home, farm and store.

Try to imagine the situation if the power industry overnight lost the total industrial load. Costly turbines would stand idle; those that continued to operate would do so at much reduced efficiency. Transmission and distribution systems would carry but a fraction of their capacity. Expenses would keep on about as high, or conceivably higher than before the industrial business was cut off, meaning that the cost of the delivered kilowatthours would soar beyond reason. In a short time sharp rate increases to domestic and commercial customers would have to be made. In all probability no rates high enough to avoid bankruptcy could be charged, simply because the public could not afford to pay them. These same technical-economic laws apply to all electric power enterprises—commercial, government, state and municipal. Once you have a huge plant capable of delivering cheap electricity you must have a correlating load and load factor to avoid huge losses.

Let us consider what has happened during the past seven years. With the pinch of the depression came intense pressure upon every industrialist to examine expenses and cut to the bone. The demand factor basis of purchased power rates placed us at a temporary disadvantage on account of the reduction of industrial production. These same forces of adversity sharpened the ingenuity of those back of competitive forms of power capable of individual installation —steam, oil, gas. Marked improvement in design and efficiency of such prime mover equipment began to take place, accompanied by sharply lowered investment cost.

Naturally enough, the manufacturers of competitive power equipment, representing the "outs," employed intensive selling methods, including publicity and advertising against electric light and

power companies, representing the "ins." During a period of non-industrial expansion they naturally went after business connected to our lines, and nobody can quarrel with them for doing so, unless he wants to argue against technical and economic progress. Thus we enter a period of keenest competition. Our competitors promise to become more able, more alert, every day.

I feel that you on the firing line will agree generally with what I have said, because you are close to the actual conditions. You know it far better than I do. We must be certain that our top executives understand the situation completely.

There was vital necessity for increasing residence, commercial and rural business.

In the process some very interesting changes have taken place. Not only have the power companies sold household appliances and lighting far more widely and effectively than ever before, but there has come into existence cooperative assistance of force and magnitude scarcely imagined a few years ago.

Today we find some of the largest manufacturing companies in the country, and a great many smaller ones, successfully spending large amounts for the promotion of all manner of household electric appliances—from refrigerators, ranges, radios and water heaters down to table appliances and lamp bulbs. They employ the foremost sales and advertising talent and are linked with far-reaching distributing organizations, embracing the largest department stores, the great mail order and chain establishments, and thousands of retail outlets of pretty nearly all kinds and descriptions.

In fact, we are almost embarrassed by the multitude of interests devoted to promoting things that can't operate unless they use our electricity. Show me another industry so favored, with the notable exception of the petroleum industry—one that has institutions like the General Motors Corporation, the General Electric Company and subsidiaries, the Westinghouse Company, Kelvinator Corporation, Borg-Warner, Pittsburgh Plate Glass Company, Sears, Roebuck, Montgomery Ward—to mention only a few of the great ones—working night and day to hook current consuming devices on our lines. Look over the feature pages of the national women's magazines and see how cleverly and how much they are doing for the growth of our residential business. And then think of some of the big retail establishments like Marshall Field's, Wanamaker's, Macy's, Gimbel's—you might name them all if time permitted—devoting valuable floor space and much advertising to getting the public to buy objects that make the meters click. Go around the corner in your neighborhood business center and you find the same thing. Step into your optician's or your paint store or furniture store and get another boost for electricity. Learn how far behind portable lamp manufacturers are with current demands.

Nor is this all. Back up in the headquarters of the big manufacturing companies they arrange more and more liberally for the financing of these electrical appliances so that anyone who has a dollar coming in regularly, who wants to buy, can do so and take several years to pay.

With all these great forces working in our behalf, last but not least, we are still further blessed with the keen interest of the national government and its outstanding ability to obtain front page publicity and to extend financial assistance for building farm lines, installing wiring and purchasing appliances. All in all, a great combination.

So what?

Well, as I see it, the one important section of our business, in which we receive little or small aid from *outside* sources, is the same department most sharply subject to direct and increasingly vigorous competition—that part of our business which we must retain and add to proportionately as the price of industry existence. *In this endeavor the only source we can rely on is ourselves.* This formidable undertaking cannot be farmed out to anyone else; the job is peculiarly and distinctly our own. The large manufacturers of industrial power equipment must sell it. You can hardly expect them to devote costly advertising appropriations advocating purchased power, although I have had the temerity to suggest something of the kind. We have the active friendship of these manufacturers, but their market is a broad one and they must face conditions as they sternly are—not as they, we, or anyone else would like to have them.

One looks in vain for any allied or interested business organizations which can be expected to cooperate with us in holding and gaining industrial power business. And yet from an industry standpoint, in our trade associations, committees and inter-company groups, industrial power has received little attention for years, compared with that accorded other chief sources of business. An outsider might look over many convention programs and committee agenda without knowing that the industry supplies industrial power at all. Last March, however, the first national conference of power sales engineers within memory was held in Chicago under the sponsorship of the Sales Committee of the Edison Electric Institute. Much benefit resulted from the exchange of information and experience at this conference and it is planned to repeat it next Spring. It also produced the genesis of a movement for a limited program of national advertising, which has taken definite form.

Now, at first thought almost anyone would say that the marketing of industrial power is principally dependent upon personal contact, careful engineering and economic calculations, persistent study of customers' requirements; adequate and reliable service; a relationship somewhat like lawyer and client, between the power sales engineer and the industrialist; a "careful combing of the prospective field," as one leading executive expressed it—*and so it is.*

It is correct, also, that power is sold on confidence based on wearisome mathematics and cold facts; not by pictures of pretty kitchens and subtle appeals to feminine pride. The human touch—such as the value of children's eyesight—is not there. Nor can we cultivate a warfare on germs, as in refrigeration. No; it's a matter of pencil, paper, slide rule and unromantic dollars and cents. To the industrialist power is simply one of the raw materials—often not a major one—among the elements going into whatever he is fabricating or handling.

Again, in the lack of national advertising of the fundamental advantages of purchased power, we are *not* far behind the industry's record as a whole in the matter of self-expression. During the past eight or more years of vicious, unremitting criticism and destructive legislation, the industry has been singularly tongue-tied, in so far as broad, effective publicity is concerned. When such a handicap is evident, it is an easy thing for our sharpminded, self-seeking adversaries to color public opinion the hue they desire painted.

I never so acutely realized the lack of public knowledge of the broad facts about our business—although this incident was purely local—as when an old friend of mine told me the other day he thought that the supplying of *hydro*-electricity in Chicago was a big mistake; that power made from coal from Illinois mines would be cheaper, and in addition would furnish employment for miners and railroad workers. This man had lived an active business life for 40 years

in the city of Chicago, in close touch with the industrial and commercial life of the community and yet he thought that water power from far-off points lighted the homes and ran the factories in one of the greatest steam electric centers in the world. When ignorance like this exists, what indictment of our failure in the art of publicity may be drawn?

Here is an incident to illustrate my point. A power company had an important rate reduction to announce. It was decided to take a page advertisement in which the president would make a little speech, pointing out how low the new rates were compared with others throughout the country. One of his lieutenants had a bright idea; namely, for the president to go a little further than saying he was personally glad that the rate reduction was possible—to go a bit beyond this and declare that it was his highest ambition as a utility executive to so conduct the business that eventually the local rates would be the very lowest in any big city in the United States. That would be the goal toward which he would honestly strive.

This bright idea never got anywhere. To my mind failure to adopt such an advertising theme was a mistake and not in step with public psychology; not conducive to the intangible something that reacts for or against popularity.

The public conception of the industrial power side of our business may be zero or it may be almost anything—all the way from a picture of a remorseless, profit-exacting monopoly, to a helpful, economy-making friend, quite satisfied to be employed when customer achievement can be promoted; quite content with only those power jobs which it can do better or cheaper, or both, than its competitors. And down at the bottom, whatever the picture, it is just what we make it ourselves. Ours is the choice whether *we* paint the picture in public psychology or let our opponents be the artists.

Assuming that all this is true, there are some of us who are convinced that a certain kind of conservative national advertising can be of material assistance.

Here let me say a word or two about publicity, as distinguished from advertising. The collection of information regarding the performance of competing plants is one thing, and articles for publication, particularly in newspapers and magazines, is another.

It's true that there is a flood of loose and misleading information being printed in newspapers and popular and business magazines read by the general public, and there is a lot of it in the technical and trade press. These groups of publications, general and specific in their nature, fall into two classes, each requiring different treatment. The first group—general publications—requires articles written in a popular, broad, easily understood style. Very few power engineers or salesmen are gifted with the kind of writing ability necessary to make a mechanical subject interesting to the mass. The work has to be done by writing specialists, just as the articles about electric cookery and kitchen modernizing in the women's magazines are done; or newspaper articles on business and finance are prepared by the trained reporter.

Now as to the general publicity, and some of the trade and class journal publicity, there is nothing to be gained by "answering back." The wilder the claims made the less real harm they will do us. The antidote is to be found in counter publicity of a constructive nature. Why did central station power grow at all; what is it doing today; what are its fundamental advantages industrially and socially; what is it going to do in the future; why is the subject of public interest; what are some of *its* achievements.

The technical and trade press should be dealt with somewhat differently and called to account for misstatements and exaggerations, as well as supplied with constructive factual material.

But you will find that to attain good publicity results the effort must be carefully planned and organized and have an essential core—that core is skillful, attractive paid advertising. All experience I know of goes to prove this.

The Industrial Power Committee of Edison Electric Institute has made a survey of opinion on the benefits to be derived from an advertising program. The Chairman, H. C. Webb, Jr., submits that an effective advertising program could be presented in a small tentative group of national publications, widely read by business men and executives. Many people other than plant superintendents, factory managers and consulting engineers have a voice in the selection of power sources, he pointed out, and in view of the extensive publicity accorded competitive power, it is important that the story of purchased power be presented in a far broader way than is now being done.

A resolution presented at the meeting of the E.E.I. Sales Committee and adopted in principle points out that advertising can be done only by the joint action of a large proportion of the companies composing the industry as a whole. If approved, a committee will be appointed for the compilation of a definite and complete program, including media, copy and method of financing.

In regional and local fields there is a present need for more and better advertising than has been evident in recent years. This, too, is a problem requiring careful thought and treatment. Some companies already have revived direct mail effort on a systematic basis. So far as I know, the campaign of the Petroleum Electric Power Club is the only current example of what may be done in a regional way. Irrespective of the outcome of the proposals for national advertising, the local and regional efforts should be continued and improved. There is also an opportunity in certain large industrial fields for several directly interested power companies to join in programs in specific trade papers.

I do not wish to be understood as in the slightest degree discouraged over the future of the industrial power part of our business. While the efficiency and price of competitive forms of power are made more attractive to the user, we are also making progress in the same direction. The average kilowatthour price of purchased power has been reduced more than 15 per cent in the past decade, and the tendency is downward. There are many sound, substantial, economic advantages in purchased power which are fundamental. But we must meet competitive selling with methods and practices as good or better than the opposition. This realization must extend to the top executives, so that they will be in position to authorize the support needed in the application of approved modern salesmanship.

Now, in closing, I want to reaffirm my faith in the electric light and power industry—widely owned and commercially operated—and confidence in its future. It isn't perfect and never will be, but it has done a mighty good job for the United States of America, and it will do a far better job in the days to come if given a fair chance by the people. Any industry has to be mainly sound and mainly beneficial to stand up under the fanatic political punishment of the past few years.

Having survived, there are brighter days ahead, provided that we conduct the entire business with complete recognition that it is 100 per cent competitive, and not monopolistic; provided, that it is operated with the true spirit of salesmanship at the helm; and provided we find our voice so the people may truly understand that we are their friends and not the imaginary enemies invented by our adversaries.

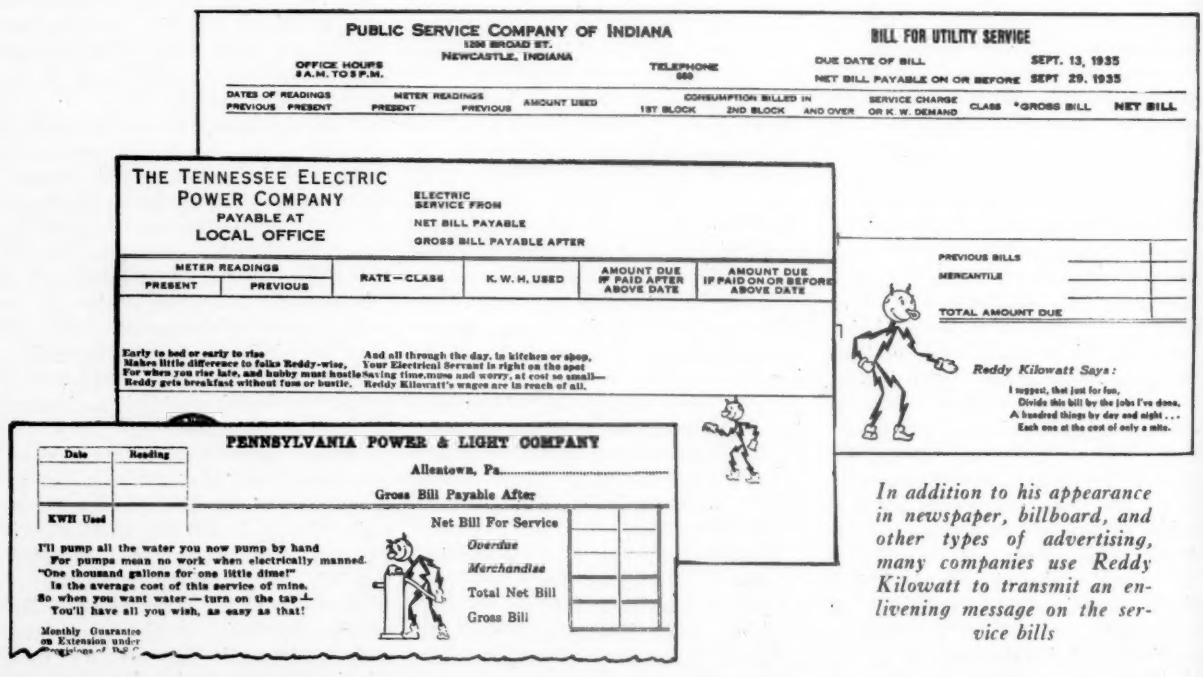
Reddy Kilowatt Becomes an International Figure

REDDY KILOWATT, the versatile, genial character originated by Ashton B. Collins of Birmingham to interpret and personify electric service to the public in advertising programs of all types has become an international figure with his recent adoption by companies operating in Canada, Mexico, and Cuba.

Since the introduction of Reddy Kilowatt three years ago, some fifty companies operating in more than half of the states, and serving some 18 per cent of the wired homes of the country, have adopted the Reddy Kilowatt program. Included in the companies now licensed to use the Reddy Kilowatt symbol and program are:

Philadelphia Electric Company
Pennsylvania Power & Light Co.
Tennessee Electric Power Company (1935 Coffin Award)
Ohio Edison Company
Alabama Power Company
Hartford Electric Light Company
Milwaukee Electric Ry. & Lt. Co.
Northern New York Utilities
Peoples Gas & Electric Company of Oswego

Utica Gas and Electric Co.
Idaho Power Company (1936 Coffin Award)
Tide Water Power Company
Southern Indiana Gas and Electric Co.
Public Service Company of Indiana
Northern Indiana Power Company
Kentucky Utilities Company
Lexington Utilities Company
Brooklyn Edison Company
Delaware Power and Light Company
Kansas City Power and Light Company
Oklahoma Gas & Electric Company
Antwerp Light and Power Company
Fulton Light, Heat and Power Company
Malone Light and Power Company
Bradford Electric Company
Southwestern Gas and Electric Company
Baton Rouge Electric Company
El Paso Electric Company
Connecticut Light and Power Company
Buffalo General Electric Company
Syracuse Lighting Company
New York Power and Light Company
Central Illinois Light Company
Erie Lighting Company
Erie County Electric Company
Gulf Power Company
South Carolina Power Company
Lockport and Newfane Power & Water Supply Company
Niagara Electric Service Corp.
Niagara Lockport and Ontario Power Corp.
Tonawanda Power Company
Wisconsin Power and Light Company
The Connecticut Power Company
Duke Power Company
The Arizona Power Corp.
Chester County Light and Power Co.
St. Lawrence Power Company, Ltd.
Compania Cubana de Electricidad
Cia. Nacional de Electricidad S. A. (Mexico)


PUBLIC SERVICE COMPANY OF INDIANA
1250 BROAD ST.
NEWCASTLE, INDIANA
BILL FOR UTILITY SERVICE
OFFICE HOURS 8 A.M. TO 5 P.M.
TELEPHONE 680
DUE DATE OF BILL SEPT. 13, 1935
NET BILL PAYABLE ON OR BEFORE SEPT 29, 1935
DATES OF READINGS PREVIOUS PRESENT
METER READINGS PRESENT PREVIOUS
AMOUNT USED
CONSUMPTION BILLED IN 1ST BLOCK 2ND BLOCK AND OVER
SERVICE CHARGE OR K. W. DEMAND
CLASS
*GROSS BILL
NET BILL
THE TENNESSEE ELECTRIC POWER COMPANY
PAYABLE AT LOCAL OFFICE
ELECTRIC SERVICE FROM
NET BILL PAYABLE
GROSS BILL PAYABLE AFTER
METER READINGS PRESENT PREVIOUS
RATE—CLASS
K. W. H. USED
AMOUNT DUE IF PAID AFTER ABOVE DATE
AMOUNT DUE IF PAID ON OR BEFORE ABOVE DATE
PREVIOUS BILLS
MERCANTILE
TOTAL AMOUNT DUE
Early to bed or early to rise
Makes little difference to folks Reddy-wise,
For when you rise late, and hubby must hustle
Reddy gets breakfast without fuss or bustle.
And all through the day, in kitchen or shop,
Your Electrical Servant is right on the spot
Saving time, money and worry, at cost so small—
Reddy Kilowatt's wages are in reach of all.
Reddy Kilowatt Says:
I suppose, that just for fun,
Divide this bill by the jobs I've done,
A hundred things by day and night . . .
Each one at the cost of only a mite.
PENNSYLVANIA POWER & LIGHT COMPANY
Date
Reading
Allentown, Pa.
Gross Bill Payable After
KWH Used
Net Bill For Service
Overdue
Merchandise
Total Net Bill
Gross Bill
I'll pump all the water you now pump by hand
For pumps mean no work when electrically manned.
"One thousand gallons for one little dime!"
Is the average cost of this service of mine.
So when you want water—turn on the tap!
You'll have all you wish, as easy as that!
Monthly Guarantee on Extension under

In addition to his appearance in newspaper, billboard, and other types of advertising, many companies use Reddy Kilowatt to transmit an enlivening message on the service bills

Regional Integration of Electrical Utilities in Foreign Countries

A Review of the World Power Conference Papers on This Subject

Systems in Western Europe not governmentally planned—High tension networks are well developed but they are devoted to the practical services and benefits they may afford and are obviously not the product of planned economy—In the electrically more backward countries of Eastern Europe, and in China, there appear to be developments of the type that was apparently contemplated when the topic "Regional Integration" was set up.

By Alexander Maxwell

Director of Engineering, Edison Electric Institute

ONE of the general topics scheduled for discussion at the recent World Power Conference was "Regional Integration of Electric and Gas Utility Facilities"; these notes will consider only the papers and discussions relating to electricity. Twelve papers were submitted on this topic and additional information was available from the discussion and from papers on other topics. In view of the fact that the subject was treated in different ways in different papers, it may be worth while in the first place to ascertain what was meant by the topic "Regional Integration."

From one point of view any transmission interconnection might be considered a kind of integration, and there is some evidence that certain of the contributing authors took this view; on the other hand, the subject has lately had a special connotation in America. The American National Committee had in mind a scope for this topic which was quite specific. It will be recalled that the American National Committee suggested a program for all of the World Power Conference papers along lines devoted to what was called "The National Power Economy." In announcing this program the American National Committee said, with respect to the topics and detailed suggestions for subject matter[1]:

"To aid in this purpose it has prepared and presents herein outlines or anaylses of the several papers indicating the various topics the explanation or discussion of which would appear to be desirable."

and again[1]:

"No papers will be accepted unless they are clearly within the scope of the program as herein outlined. . . ."

The Program

The program for the topic "Regional Integration, etc.," in addition to suggesting discussion of the obvious technical factors entering the problem, also suggested the following detailed features for inclusion in each paper[2]:

"For the purpose of this program regional integration of electric utility facilities means the parallel operation of generating plants and their physical connection through and with transmission and distribution lines into a single system capable of being operated as a unit for the complete service of a definite geographic area."

"The paper should discuss or explain the legal and political problems involved in effecting such integration within or between adjacent sections, states or nations; . . ."

". . . whether (such integration) has resulted as the result of definite planning or merely as the result of adjustment to immediate situations. . . ."

". . . the legal and political barriers, if any, in the way of such integration within and between different political and administrative subdivisions of the same State." . . .

". . . whether such integration . . . has been due entirely to private initiative or has been due in whole or in part to recommendations or requirements of public agencies . . ."

and so on; the outline contains altogether about 650 words. Papers were expected to be of not more than 10,000 words. This program constitutes a fairly definite specification for a complete paper.

The similarity between this program specification and the applicable provisions of the Public Utility Act of 1935 is striking. The Public Utility Act, Title I, Sec 2(a) (29A) defines an electrical "integrated public utility system" as:

"a system consisting of one or more units of generating plants and/or transmission lines and/or distributing facilities, whose utility assets, whether owned by one or more electric utility companies, are physically interconnected or capable of physical interconnection and which under normal conditions may be economically operated as a single interconnected and coordinated system confined in its operations to a single area or region, in one or more states, not so large as to impair (considering the state of the art and the area or region affected) the advantages of localized management, efficient operation, and the effectiveness of regulation; . . ."

Further, the Act directs (Title I, Sec 11) that the Securities and Exchange Commission shall take action to form holding company systems into single integrated public utility systems, and in Title II, Part II, Sec 202, the Federal Power Commission is directed to "divide the country into regional districts for the voluntary interconnection and coordination of facilities for the generation, transmission and sale of electric energy. . . . and to promote and encourage such interconnection and coordination" and in Sec 202(b) the Commission may "by order direct a public utility. . . . to establish physical connection of its transmission facilities with the facilities of one or more other persons engaged in the transmission or sale of electric energy to sell energy or to exchange energy with such persons." Further in Sec 202(c) the Commission is given much more decisive powers in certain emergencies such as a shortage of electric energy or of electric facilities or *other causes*.

The topic which the foreign member nations of the World Power Conference were invited to discuss, and whereof their papers might not be accepted if they did not, was therefore to all intents and purposes the legislative situation in the United States, with respect to a bill already enacted but not yet operative with respect to integration. It

[1] Program, Third World Power Conference, pp. 13-14.

[2] Program, Third World Power Conference, pp. 40-41.

is the purpose of this article to summarize what the foreign members reported.

The American Contribution

Before actually passing to the foreign contributions it may be advantageous to review the two American papers contributed to this subject. One of the papers, by Mr. Geo. N. Tidd, describes the achievements of the American light and power industry in the field of interconnection and economic integration, as accomplished wholly by private initiative subject to regulation; it is not necessary to review this paper here in great detail, since the actual examples cited are well known to Americans. One feature of Mr. Tidd's paper should be commented upon, namely, wherein he shows that some of the American operations, fully absorbing the economic possibilities of integration and executed, as it were, in the course of the day's work, exceed in magnitude the entire electric facilities of some of the reporting countries, measured as to area, extent, capacity or output, or any or all of these factors.

Special reference is due to the paper submitted by Mr. Basil Manly for the reason that the author is the vice chairman of the Federal Power Commission and his paper frequently cites the Public Utility Act of 1935 and contains an amplification of the provisions affecting integrations that presumably reflects the views of his office and therefore in a way may throw light upon the situations to which the foreign contributors were invited to address themselves.

The parts of Mr. Manly's paper relating to regional integration policies start with a statement that, in spite of the past achievements of private utilities, "a new standard regarding the character, extent and cheapness of electric service is now being developed in the United States that demands the cooperation of governmental agencies with all the elements of the industry.[3]" The paper then develops certain distinctions between "integration" and "coordination" wherein the author follows a theory that integration involves centralized ownership and extends to all functions as far as distribution and sales, and, on account of the ownership feature, is inapplicable to Federal or municipal projects. On the other hand, according to Mr. Manly, coordination or "pooling" may be applied to mixed groups of privately owned and public undertakings. In view of the author's stress upon these distinctions it is interesting to recall that "integration" is an operation to be performed by the Securities and Exchange Commission upon holding companies, while the Federal Power Commission is enjoined in Title II of the Act to promote and encourage, and in some cases to require, "interconnection and coordination of facilities."

After describing certain types of coordination of private utilities where it appears to the author that the good offices of the governmental authorities may be advantageously used to "promote and encourage," Mr. Manly goes on to consider the types of coordination where Federal power projects are involved, and where, presumably, integration is inapplicable according to his definition unless expropriation is practiced. Mr. Manly outlines certain major considerations which, he says, must be provided in such cases. These considerations may be abstracted as follows:

(1) An effective Federal agency must be created to operate the pool. Such agency should preferably have a board of directors in which the national interest would be preponderantly represented but which would also afford an opportunity for regional and local interests to have an effective voice.

(2) The agency must possess adequate power and financial resources to acquire control of or construct a transmission network . . . etc.

(3) All participants in the pool must commit themselves to place their facilities under the control of the managers of the pool.

(4) All distribution systems whether publicly or privately owned, shall be supplied at uniform rates for similar communities.

(5) The agency must possess adequate powers to extend the system.

The purport of Mr. Manly's paper was evidently to present explicitly what had merely been implicit in the specified topics set forth in the program, namely, the role of government in the formation of regionally integrated systems or in other aspects of coordination or "pooling." The evidence of foreign practices and views may now be reviewed.

THE FOREIGN CONTRIBUTIONS

Great Britain

Mr. Harold Hobson's paper commences with a statement that "in the large-scale integration of public utilities Great Britain can with justice claim to occupy a pioneer position," although for the production of electricity only. The development of the famous British "Grid" is then described.

The purpose of the Grid is simple and obvious. It was brought into being partly to utilize the output of large and efficient plants for all power requirements in place of the many small and inefficient plants then existent in Great Britain and partly to prevent waste of capital outlay in the further extension of such small plants. Since it was a novel and much larger type of public utility than any theretofore contemplated by the British laws a special Act of Parliament was necessary to provide a statutory basis for it. So far as regional coordination is concerned, if the Grid has any effect it is a negative one, since it buys and sells energy in many cases to overlapping or competing utilities in the same city or area, thus tending, in some measure, to support and perpetuate these duplications, and it has no power to do otherwise.

There appears to be a lack of agreement among non-British writers concerning the functions of the British Grid and its relation to government. It is described in Mr. Basil Manly's American paper (page 12) as follows:

"The 'Grid' is an example of *nationally owned and operated* interconnecting facilities with governmental control of generation and load despatching. . . ."

and again on the same page,

"The fundamental principle of the plan was that the supply of electric energy should be regarded as a unit, for the provision and maintenance of which the government should assume complete responsibility."

and further in a press release prepared by the American Committee referring to the Tidd and Manly papers[4]:

". . . the role of government in coordinating electric utilities into a series of systems *comparable to the British Grid.* . . ."

Mr. Hobson, the author of the British paper, is the general manager of the Central Electricity Board. He says[5]:

"Although appointed by a Minister of the Crown, the (Central Electricity Board) is in no sense a government department. It is given complete business autonomy within the limitations of the (Electricity Act of 1926), but must present a report and accounts annually to the Minister of Transport. The Board is itself constituted a public utility and as such is subject to supervision and regulation. . . ."

Further, Colonel T. H. Minshall, a prominent consulting engineer and publicist, in discussing the series of papers on the subject "Regulation of Utilities, etc.," said:

"Reference to the Grid (in an American report) as a 'Governmental authority' might possibly lead to a mistaken impression as to its actual nature. The Grid is neither owned nor operated by Government or by

[3] Manly, WPC No. 215, p. 3.
[4] WPC Press Release No. 60705.
[5] Hobson, WPC, p. 8.

any Government department. . . . The Grid was not built with Government money but with the proceeds of bonds subscribed by the public at their own risk and without government guarantee."

Actual regional integration is not discussed in Mr. Hobson's paper, perhaps for the reason that the most important development in that direction, the McGowan Report, occurred too late for full discussion in World Power Conference papers. The current plans for integration were discussed, however, by Mr. J. C. Dalton[6] and by Colonel Minshall in the discussion quoted above, as follows:

"Had the individual 600 utilities in Great Britain, both private and public, not been forbidden by law, nearly 50 years ago, to amalgamate, integration would by this time have gone a considerable way towards producing a grid or grids. As it is, areas of up to 3000 to 4000 square miles have been integrated, independently of the Central Electricity Board's Grid."

The reason for this prohibition of amalgamation and the resultant great number of uneconomically small utilities having a medley of voltages, frequencies and rates, is shown in the McGowan Report[7] to be due to the preference among the lawmakers of the 'eighties for municipal ownership and operation of electric utilities. This same report recommends reliance upon the larger privately owned utilities as the way toward accomplishing regional integration[8]. There is no regional integration at the present time in Great Britain, nor any coordination of utilities into systems, except that which has occurred by voluntary action among operating utilities, nor has there been any intervention upon the part of the government to such a purpose.

France

The paper of MM. Ailleret and Fallou describes the several regional transmission systems that have been built since the World War and the further interconnection now in progress, of these separate systems. It is shown that these works have been done almost entirely by privately owned companies and that governmental intervention is limited to a small amount of financial assistance primarily directed toward other objectives than electricity supply and what would be recognized in America as regulation.

The authors note especially that this system of bulk transmission lines, which is extensive with respect to the area of France, has been regulated by the Ministry of Public Works, rather than by the 90 administrative departments or the 38,000 communes. France is an integral state, a little larger than Texas, and the departments and communes have no sovereignty but are merely administrative subdivisions.

The form of regulation or supervision exercised by the Ministry of Public Works is described by the authors, and in greater detail by M. E. Genissieu in his paper on "Regulation," to be of a most flexible description and concerned mainly with avoidance of duplicate works where one would serve. The situation is concisely described by M. Ailleret, one of the joint authors, in the verbal discussion, as follows:

"On account of the great distances between centers of production, the French Government has lent its moral support, and for a short period its financial support, to long distance transmission. However, the financial aid has not in any manner limited the autonomy or initiative of private enterprise. . . . Once the system is in operation of course the government ceases to intervene either from the point of view of finances or control."

Financial participation by the government has been extremely modest and exerted mainly in the direction of encouragement, by loans, to certain bulk transmission lines which were expected to be useful in bringing certain hydraulic power sources into service. These measures, in turn, were dictated by the financial crisis. Foreign exchange was a problem, and, since France normally imports a substantial part of her coal requirements, a maximum use of available hydraulic power for the purpose of conserving coal appeared to be desirable, and was perhaps imperative, although it appears to have been accomplished at some expense to basic power economy.

Although a bulk transmission network is now highly developed in France and integrations or coordinations of privately owned utilities have made considerable progress, and there appears to be an active and sympathetic system of government regulation, there does not appear to be any trace of integration by governmental intervention or governmental planning, in any of the papers having any relation to this subject.

Germany

The authors of the German contribution to the subject "Regional Integration," Drs. Muller and Vogt, did not discuss the prescribed topic at all but devoted their paper to the problem of merging of gas and electric facilities, another aspect of over-all energy economy. However, certain references are made in other papers, notably the papers of Min. Dir. Dr. Pohl on "National Power and Resources Policies," Drs. Menge and Schult on "Significant Trends" and Profs. Peterson and Tröger on "National and Regional Planning," which enable over-all conclusions to be drawn as to German practices for regional planning.

The development of electric power supply in Germany since 1913 is historically almost as tempestuous as the political history of the country, so far as large scale organization is concerned. It is important to note, however, that technical progress, and, commensurately with economic conditions, commercial progress, has proceeded steadily throughout this period. Electric utilities before the World War were predominantly owned by private interests; after the war and during the Republic, utilities passed into the hands of the various Federated States where, after a brief and unprofitable period of government management, the States disencumbered themselves more or less completely by disposing of the utilities to new and large joint stock companies, which now are typical of German utility organization. The question of organization is further complicated by the existence of large utilities of "mixed" public and private ownership, and by the prominent role played by great industrial users of electric energy.

Since 1933, under the existing political regime, important regulatory developments have taken place, culminating in the "Energy Economy Act" of December, 1935. So far as regional integration is concerned, the three papers cited here show that regional integrations or coordinations of facilities have proceeded steadily since 1913, according to the technical and economic requirements of the utilities concerned, without any but sporadic governmental intervention and certainly without governmental national planning.

Sweden

In Sweden the state maintains an extensive generating and transmission system which accounts for one-third of all of the electricity produced in that country. The paper by Dr. Borgquist, chief director of the Royal Board of Waterfalls, deals particularly with regional integration.

The availability of large amounts of

[6] EEI Bulletin, Sept., 1936, p. 358.
[7] Report of the Committee on Electricity Distri, Gt. Britain, May, 1936, pp. 5-6.
[8] Same; also abstract of report in EEI Bulletin, Aug., 1936, p. 325.

power at the disposal of the State has undoubtedly influenced the development of other generating and transmission projects; nevertheless there does not appear to have been any disposition upon the part of the State to direct, or still less to force, regional integrations. On this point the author says[9]:

"The development here described (the generating and bulk transmission facilities of Sweden) has grown up out of the natural conditions. As regards the State, no other positive measures have been taken than those described in Paper No. 8 (describing regulatory measures affecting technical matters and rates) . . . there has not been worked out any future program for this power supply, which has developed without restrictions, as concerns regional power supply."

The same author in another paper dealing with national and regional planning, says further with regard to legislation for the conservation of national resources[10]:

". . . while legislation has come into force concerning agricultural and forest exploitation, in the domain of water-power great freedom has been left to private enterprise. The intervention of the State has been limited to the regulating of certain juridical and technical conditions together with the inspection and supervision of electrical installations and materials as regards their safety for persons and property."

Norway

Although ample statutory powers exist, and Norway has comprehensive laws regulating fisheries, whaling and forestry, nothing has been attempted in the field of electric power beyond the exertion of a regulatory influence. In Mr. Bärnholdt's paper on Regional Integration it is stated that the only existent project of this kind is that in East Norway, in the Oslo district by an "Association for Parallel Operation, Ltd.," consisting of ten representatives of operating companies, and without any representative of the State, although power is purchased from the State-owned "Nore" hydraulic plant.

In Mr. Wedervang's paper on "National and Regional Planning in Norway" the situation is described as follows:

"Economic planning on a generally comprehensive basis, similar to that carried on in some countries with absolute governments, and implying a centralized direction of all trade, has not so far been the policy of Norway."

Holland

A report prepared by the Association of Managing Directors of Electricity Supply Undertakings in the Netherlands describes a few purely technical and isolated interconnections, notes that the State has not intervened in the direction of planning, and sums up the situation in Holland as follows:

"If it is assumed that the integration of electric utilities includes the parallel operation of two or more power plants in such a manner that the combined territories of the undertakings concerned are supplied with electricity by a network of transmission and distribution lines so that the whole area may be regarded as one electrified district, then it must be stated that such integration cannot be found in the Netherlands."

It will be seen from the foregoing abstracts that there are no regional integrations in Western Europe, as defined by the American governmental paper, so far as it is revealed by the papers submitted to the World Power Conference on this topic or by any related papers. There are many bulk transmission networks but none of these apparently are the result of governmental planning.

In the countries of Eastern Europe, more backward electrically, and in the Orient, there appear to be examples of true governmental planning for integration. Some of these may be examined.

Austria

The post-war situation in Austria is dominated by the loss of fuel resources and the consequent pressure for the development of available water power. The paper submitted by the Association of Electric Utilities describes the development of transmission facilities. There is no indicaton of organized regional integration or of governmental intervention except for facilitating rights-of-way and on the question of export of energy.

Hungary

Although there is not at present any planned regional integration in Hungary and existing systems have extended at will, the paper submitted by Prof. de Verébely describes plans based upon an Electricity Supply Act which became effective in 1934, which will provide the Ministry of Industry with rather extensive powers, including fixing and changing rates, closing down of inefficient plants, etc. The situation in Hungary is dominated by the loss of territory in the World War, lack of funds, and the circumstance that about one-half of the entire power consumption of the country is concentrated in and around Buda-Pest, the capital.

Czechoslovakia

The paper by Dr. J. Kneidl describes measures taken by the Czechoslovakian Government for the systematic electrification of the hinterland which resulted in laws enacted in 1919 and 1921 giving wide powers to the Ministry of Public Works. According to Dr. Kneidl, this legislation applies only to Carpathian Ruthenia, Slovakia, Moravia and the greater part of Bohemia. The northwestern part of Bohemia bordering on Saxony and Silesia was exempted for the reason that this industrial and densely populated district was already "fairly well supplied with electricity." The exemption is important for the reason that this district, which comprises only about 8 per cent of the area of the republic, consumes approximately two-thirds of all energy produced, around 2 billion kwhr in 1934, while the remaining 92 per cent of the area of the republic, to which the following remarks apply, consumed about one-third of the total output, roughly one billion kwhr.

The law applying to these relatively undeveloped areas provides for an extensive participation by the State, both financially and in connection with new projects and regional integration. Provisions are made also for participation by provinces and municipalities and for participation by private capital in a limited way, not to exceed 40 per cent of the total capital. This provision was later modified to permit participation up to 75 per cent in special cases.

Twenty public utility companies were founded throughout the parts of the republic affected by the law. The existing facilities were used in greater part but there are plans for further integrations in the future. The governmental participation in these twenty companies amounted in 1932 to about 125 millions K_c or 25 per cent of the total capital. The companies comprised 515,000 kw capacity and 23,000 km of lines in 1932; they furnished 782 million kwhr. The effect of the expansion of service in these largely non-industrial areas is indicated in part by data in the report indicating that in 1919 the total investment was approximately $120 per kw of generating capacity and the load factor 0.21 whereas in 1934 the total investment was equal to approximately $204 per kw of capacity and the load factor 0.17.

Bulgaria

A paper on "National and Regional Planning" submitted by the Bulgarian Ministry of Public Works describes a new law, the Electric Economy Act of 1935, under which, in the words of the General Reporter, "The State becomes

(Continued on page 458)

[9] WPC Borgquist, "Regional Integration."
[10] WPC Borgquist, "National and Regional Planning," p. 4.

A Coordinated Plan of System Development

By George J. Read

Consolidated Edison Company of New York, Inc.

A Paper Presented at a Meeting of the Electrical Equipment Committee, E.E.I., Rochester, N. Y., Oct. 27, 1936

CONSIDERABLE emphasis has been placed on the subject of scientific system planning by electric utility companies and associations during the past ten or fifteen years. Some progress has been made by the more active utilities, but, relatively speaking, a comprehensive job of system planning has not as yet become effective. Certain phases of system planning as outlined in the past by committees of the E.E.I. and N.E.L.A. are being carried out by individual companies, but there are still some missing links.

A detailed review of the material available on this subject is unnecessary. It is desirable, however, to point out briefly some of the more important phases of these outlines and in so doing present some of the actual accomplishments of the Brooklyn Edison Company.*

Plan Involves Entire Company

In previous discourses other engineers have indicated that the planning group must be an authorized and recognized one under the direct supervision of the chief executive, but this is only fundamental. In addition a coordinated plan for system development, to be effective, must be carried out by all branches of the Company. All groups must work together to accomplish a predetermined common goal. The engineers must determine the proper type of distribution system and after approval by the executives, all construction and improvements must be such as to ultimately work into this approved system. It must also be determined as to just when to install the ultimate facilities. For example, is it more economical to install small cable in lightly loaded outlying areas at first or to install the final size cable initially? Similar determinations must be made for subway, manholes, poles, services, meters, etc. As a function of load forecasting, the future market for electrical appliances must be studied and physically located. After this has been scientifically done, it then becomes the function of the commercial group to go out and concentrate their effort on the territory most suited for the sale of the various heavy duty appliances. The definite correlation of engineering design and commercial sales effort will result in the increased sales of appliances and in the more economic installation of distribution facilities which form so large a part of our costs.

*This discussion is limited to the Brooklyn Edison Company portion of the Consolidated Edison System since that is the Company Mr. Read has been associated with until recently.

MR. READ

Complete Statistical Background Imperative

In order to make a comprehensive analysis for future planning, it is absolutely necessary to have complete and accurate records of past experience readily available. Such records must be centralized and kept in a standard form. Figure 1 shows a section of a typical data sheet which indicates the number, size and voltage of transformers on the system from 1920 to date. The original size of this sheet is 11 in. x 17 in. and contains similar information for subway, manholes, poles and services. This is an example of the fifty or more sheets already prepared and bearing such titles as:

Analysis of Brooklyn Load
Generating Station Capacities, Demands, Energy Production and Sales
Kwhr Sales—Kwhrs Net Generated—Meters
Direct Current System Data
Alternating Current Network Data
Energy Consumption and Demand of High-Tension Consumers
Underground and Overhead Cables
Recapitulation of Meters, Kilowatthours, Revenue and Densities by Meter Districts
Recapitulation of Expenses and Income
Distribution System Fixed Capital and Operating Expenses
Operation and Maintenance Expense

Load Forecasting

The subject of load forecasting always brings to mind the prognostication of total system load for the purpose of providing required generating station facilities. Up to recent years the straight-line extension of the load curve was quite generally accepted by the utility industry and business in general followed a similar practice. If this trend line was found to be too high in any one year it was simply revised and advanced to the next. This method was fairly accurate before the depression when the load was increasing at such a rapid rate that the effects of past depressions were not seriously felt. Although this method has its place, it is by no means adequate. It had to be improved and augmented with a more detailed and a more searching procedure. Such an improved method entails in part, not only the prediction of total system load and total energy sales, but also the prediction of the various component classes of total sales such as residential, commercial, industrial and municipal.

The subject of forecasting energy sales can be divided into two parts, namely, (1) long-term predicting and (2) short-term predicting. By a long-term forecast is meant the predicting of total kilowatthour sales by years for ten years in advance. By a short-term forecast is meant the predicting of total kilowatthour sales by months for one year in advance. The same procedure, in the main, is used in predicting each of the four major component classes of sales comprising total sales.

Steps in Long-term Forecasting Procedure

Two independent methods are used to obtain preliminary values of total annual sales for ten years.

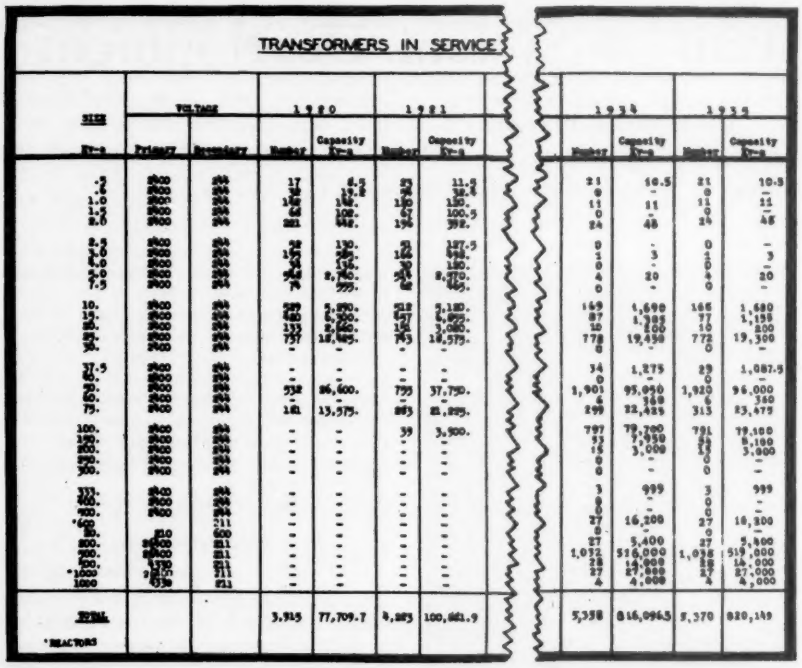

TRANSFORMERS IN SERVICE

Fig. 1—Section of a Typical Data Sheet.

A normal long-term growth curve of energy sales is mathematically determined and extrapolated by the use of the *statistical method.*

A second normal long-term growth curve is determined and extrapolated by the use of the *analytical method* which is based on an analysis of the kilowatthour use per meter in each component class and the number of meters.

A simple average of these two sets of future trend values yields a preliminary long-term forecast.

A study of the annual correlation between national business and local sales affords a means of determining a final long-term forecast as shown in Fig. 2.

Two major steps are involved in the determination of preliminary values of future monthly sales for one year.

The first step involves the revision of the annual value, taken from the long-term forecast, in the light of current business trends and local factors.

The second step involves the breakdown of this revised annual value into twelve monthly values using the King graphical method of isolating changing seasonal variation as shown in Fig. 3. These values are preliminary and are further adjusted by taking into account the monthly correlation between national business and local sales shown in Fig. 4, to obtain a final short-term forecast.

Every forecast should be a "joint" undertaking, either the result of averaging of two or more methods or the averaging of two or more independent forecasts resulting from the use of a common and comprehensive method. Group or "joint" effort tends to give better results on the average, since errors due to personal optimism or pessimism are minimized. The following table shows the per cent errors in predicting Brooklyn kwhr sales since 1930, when the foregoing forecasting procedure was inaugurated.

Year	*Millions of Kwhr* Forecast*	Actual	*Per Cent* Error
1931	1130	1092	+ 3.48
1932	1036	1057	— 1.98
1933	1077	1054	+ 2.18
1934	1140	1108	+ 2.94
1935	1140	1150	— 0.84
1936	1200	1235**	— 2.91
		6 Year Average	2.38

* "Joint" forecast made in December of the previous year.
** Estimated for 1936 based on 9 months experience.

By means of this more detailed forecasting procedure, it is possible not only to make a more accurate revenue forecast but it is also possible to determine more accurately where and of what nature the future load will be. That is, on any particular system will the growth in the residential class be in the greater use of refrigerators, ranges and water heaters and if so, just where on the system are the customers located who comprise this future market? Are they now served on the overhead or underground system and from radial or network service? Also of prime importance is the question, what distribution system reinforcements will be necessary to ade-

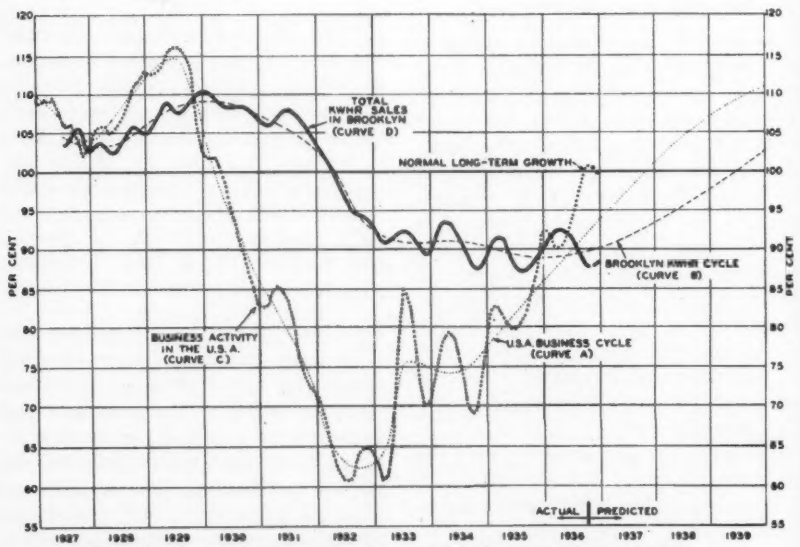

TOTAL KWHR SALES IN BROOKLYN (CURVE D)
NORMAL LONG-TERM GROWTH
BROOKLYN KWHR CYCLE (CURVE B)
BUSINESS ACTIVITY IN THE U.S.A. (CURVE C)
U.S.A. BUSINESS CYCLE (CURVE A)
ACTUAL
PREDICTED
PER CENT
1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939

Fig. 4—Brooklyn Energy Sales and National Business Activity.

The major cyclical variations of national and Brooklyn business are represented by the Curves A and B respectively. These curves are the trends of Curves C and D.

Curve C is the Annalist (N. Y. Times Co.) index of business activity in the U. S. A. It comprises the physical volume of activity in twelve major basic industries, the monthly data of each industry being adjusted for seasonal variation and normal long-term growth (secular trend). These adjustments permit the combining of the twelve heterogeneous series of data into a composite index of general business activity.

Curve D is the result obtained after adjusting Brooklyn total monthly kilowatthour sales for seasonal variation and normal long-term growth. Due to the widespread use of electrical energy in industry and the home, Curve D can be considered to be a good index of local general business activity.

quately supply this future load? If systems are to be planned economically and wisely, the location and the nature of the load to be served must be known.

The study of population trends is also an important phase of forecasting. There is every indication that population growth will continue at a diminishing rate and estimates indicate that the population of the country will become stationary within a few decades. This is possibly due to three things: (1) reduction in immigration, (2) the increasing emigration and deportation, and (3) the reduced birth rate. With the thought of a limited growth in the number of families in the near future, emphasis must be placed, in the residential class, on increased energy use per family.

Load Analysis

All engineering design for plant addition must be based on an analysis of the load. It is useful to divide the load data according to type of supply systems and geographical areas. As an example, one-half of Brooklyn is served from an a-c network system, and the rest from an a-c radial overhead and underground system, and a small underground direct-current system. To analyze and forecast load on each system, it is necessary to divide the load geographically. In making efficiency studies, and cost studies, the load must be analyzed according to the supply system. This type of analysis also applies to location of future substations, and future extensions of the transmission and distribution system. It has been observed that our system efficiency is more affected by shifts of load from one system to another, than by any other cause such as transformer loading, for instance.

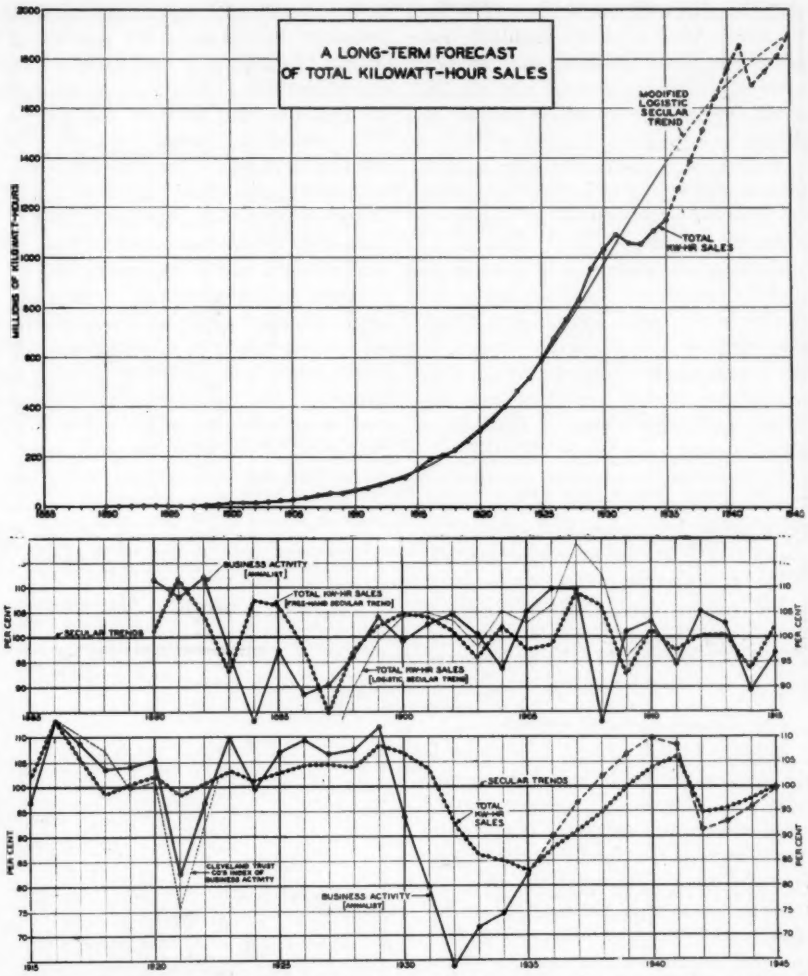


Fig. 2—The Correlation Between Business Activity in the United States and Local Kilowatt-Hour Sales.

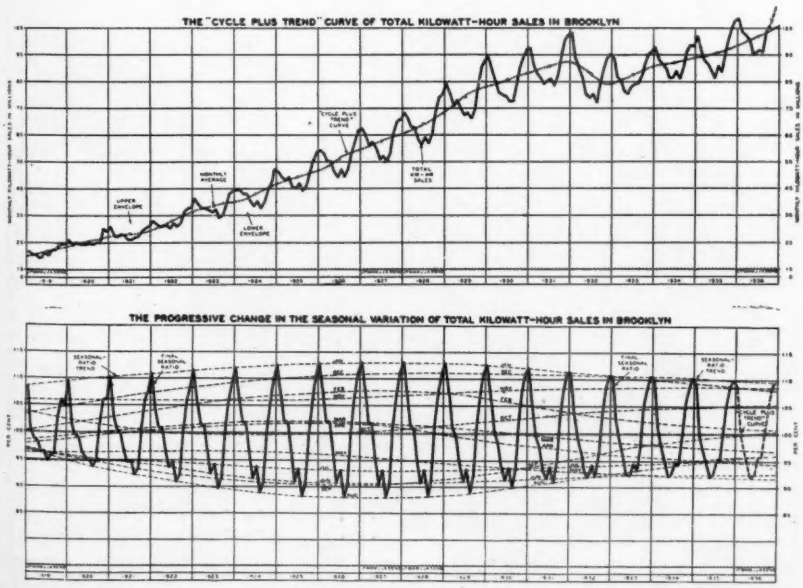

THE "CYCLE PLUS TREND" CURVE OF TOTAL KILOWATT-HOUR SALES IN BROOKLYN
THE PROGRESSIVE CHANGE IN THE SEASONAL VARIATION OF TOTAL KILOWATT-HOUR SALES IN BROOKLYN

Fig. 3

Annual Budget

The annual budget for construction and operation is essentially an engineering job, and naturally falls under the head of system planning. In preparing budgets, accurate detailed records of past experience are essential. These should also be kept in graphic form and always up to the minute in order to facilitate revision of the budget. For these reasons it is believed that the annual budget comes well within the scope of the planning engineer.

Ten Year Construction Program

Next to load forecasting, in importance, is the plan of future development. The period of time should cover ten years in the future. It is not intended

that the plan will not be changed in the ten year period, or that it should be followed rigidly if later information indicates a different course of action. To avoid "topsy-like" growth a plan is essential.

Such a plan should consider the ultimate type of system to be used, or adaptations of various systems of supply to areas as governed by load density. It should contain a detailed forecast of all plant expenditures and operating expenses, broken down by accounts. With this complete, an integrated design of the system can be obtained. When data on commercial and general expenses are added, a complete picture of the balance sheet in the future can be obtained.

In communities where an a-c network system is being installed in the downtown areas, it is especially valuable to plan the ultimate extent of the network. Thus reinforcements to the existing radial system may be made in such a way, or the type of construction employed may be such that the facilities can later be used for the network system.

Growth of the Community

Another branch of load forecasting is the best possible prediction of where and when the community is going to grow; what will be the type of building, apartments, one and two-family houses, stores, factories, etc.? What are the civic improvements to be in the next ten or fifteen years and what influence are they to exert on the various sections of the community? The forecaster must be intimately acquainted with all these factors. However, after spending considerable time and energy to make these determinations he should not be content with a 90 per cent job. He should also see to it that information of value is placed in the hands of those, both within and outside the company, who will find it useful.

Local Contact and Good Will

All such information worthy of reproduction should be prepared in maps and bulletins for use throughout the company and should further be furnished the press and local civic organizations for their knowledge and general use and publication. In most large cities there is a noticeable absence of a comprehensive plan for city growth and development and it is very difficult for individuals or organizations to visualize what is going on around them. Considerable emphasis is placed on individual civic improvement projects but there is very little publicity given to all the projects planned or under development in an area with the necessary discussion of the possible influence these projects will have on the community life. Fig. 5 is an example of what has been done on this subject. The heading is recopied from the local newspaper in which the map and necessary descriptive matter appeared. This sort of activity is an excellent builder of good-will, for our customers see that we are interested in the community and are planning our development on facts and not by chance. Carrying this same idea further, we should be cooperating to the fullest extent with our local chamber of commerce, our real estate board, industry, department stores and other local utilities and civil authorities, in a coordinated plan for civic improvement and for the attraction of new business and new residents to our community. The cost of such good-will is small but the benefits are of utmost importance.

Cost of Service

Under the scope of the planning engineer come cost studies which require a background of accounting and economics, a complete set of records, and an engineer's knowledge of the system.

Engineers can well afford to turn attention to this field of cost studies. The trend is toward attempting to reduce the cost of distribution as this represents the largest single item of cost in electric service. Before much progress can be made in this line, it is necessary to analyze what makes up the cost. It

REAL ESTATE CLASSIFIED ADVERTISEMENTS

BROOKLYN DAILY EAGLE

REAL ESTATE CLASSIFIED ADVERTISEMENTS E

NEW YORK CITY, SUNDAY, AUGUST 9, 1936

Private Industry Intelligently Plans for Brooklyn's Growth

Co-Ordination Major Goal of Boro's Future

Public, Private Projects Must Fit Into Well Studied Program

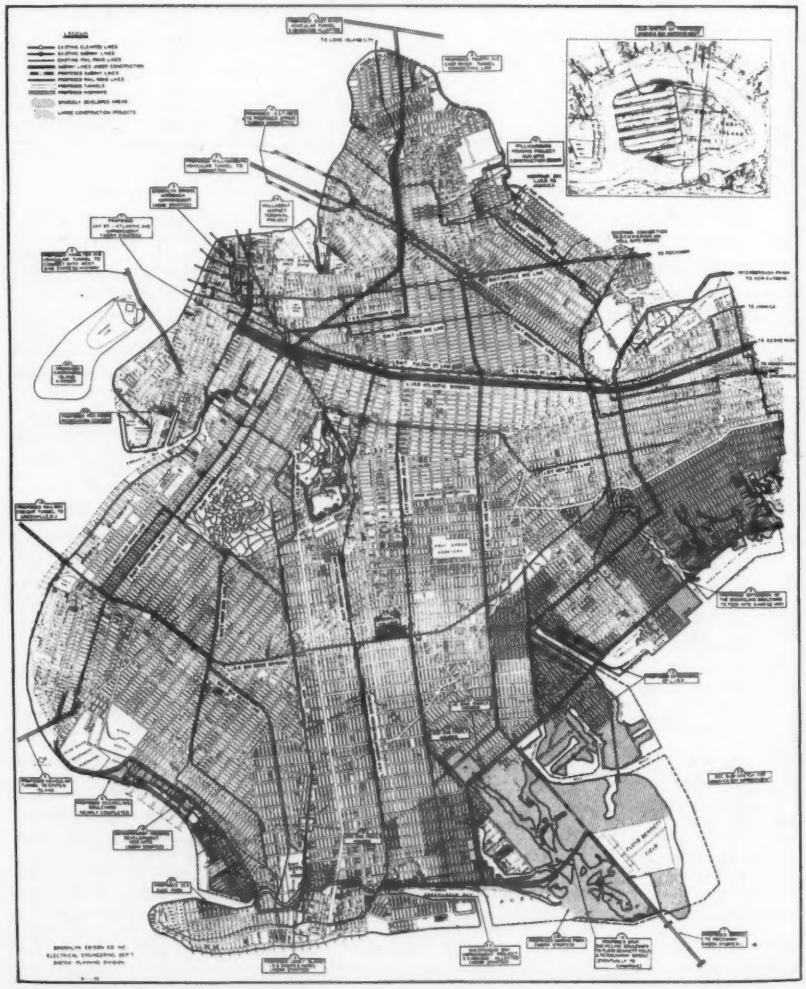
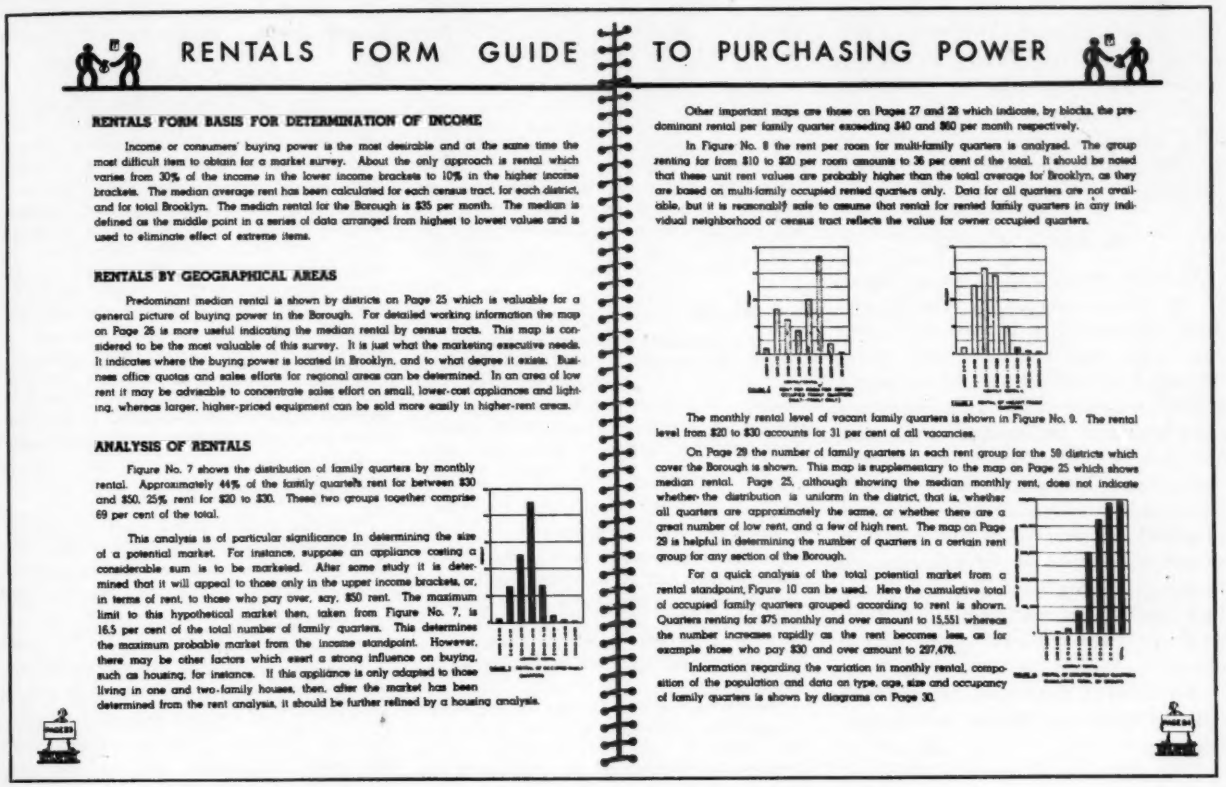


Fig. 5



RENTALS FORM GUIDE TO PURCHASING POWER

RENTALS FORM BASIS FOR DETERMINATION OF INCOME

Income or consumers' buying power is the most desirable and at the same time the most difficult item to obtain for a market survey. About the only approach is rental which varies from 30% of the income in the lower income brackets to 10% in the higher income brackets. The median average rent has been calculated for each census tract, for each district, and for total Brooklyn. The median rental for the Borough is $35 per month. The median is defined as the middle point in a series of data arranged from highest to lowest values and is used to eliminate effect of extreme items.

RENTALS BY GEOGRAPHICAL AREAS

Predominant median rental is shown by districts on Page 25 which is valuable for a general picture of buying power in the Borough. For detailed working information the map on Page 26 is more useful indicating the median rental by census tracts. This map is considered to be the most valuable of this survey. It is just what the marketing executive needs. It indicates where the buying power is located in Brooklyn, and to what degree it exists. Business office quotas and sales efforts for regional areas can be determined. In an area of low rent it may be advisable to concentrate sales effort on small, lower-cost appliances and lighting, whereas larger, higher-priced equipment can be sold more easily in higher-rent areas.

ANALYSIS OF RENTALS

Figure No. 7 shows the distribution of family quarters by monthly rental. Approximately 44% of the family quarters rent for between $30 and $50, 25% rent for $20 to $30. These two groups together comprise 69 per cent of the total.

This analysis is of particular significance in determining the size of a potential market. For instance, suppose an appliance costing a considerable sum is to be marketed. After some study it is determined that it will appeal to those only in the upper income brackets, or, in terms of rent, to those who pay over, say, $50 rent. The maximum limit to this hypothetical market then, taken from Figure No. 7, is 16.5 per cent of the total number of family quarters. This determines the maximum probable market from the income standpoint. However, there may be other factors which exert a strong influence on buying, such as housing, for instance. If this appliance is only adapted to those living in one and two-family houses, then, after the market has been determined from the rent analysis, it should be further refined by a housing analysis.

Other important maps are those on Pages 27 and 28 which indicate, by blocks, the predominant rental per family quarter exceeding $40 and $60 per month respectively.

In Figure No. 8 the rent per room for multi-family quarters is analyzed. The group renting for from $10 to $20 per room amounts to 36 per cent of the total. It should be noted that these unit rent values are probably higher than the total average for Brooklyn, as they are based on multi-family occupied rented quarters only. Data for all quarters are not available, but it is reasonably safe to assume that rental for rented family quarters in any individual neighborhood or census tract reflects the value for owner occupied quarters.

The monthly rental level of vacant family quarters is shown in Figure No. 9. The rental level from $20 to $30 accounts for 31 per cent of all vacancies.

On Page 29 the number of family quarters in each rent group for the 50 districts which cover the Borough is shown. This map is supplementary to the map on Page 25 which shows median rental. Page 25, although showing the median monthly rent, does not indicate whether the distribution is uniform in the district, that is, whether all quarters are approximately the same, or whether there are a great number of low rent, and a few of high rent. The map on Page 29 is helpful in determining the number of quarters in a certain rent group for any section of the Borough.

For a quick analysis of the total potential market from a rental standpoint, Figure 10 can be used. Here the cumulative total of occupied family quarters grouped according to rent is shown. Quarters renting for $75 monthly and over amount to 15,551 whereas the number increases rapidly as the rent becomes less, as for example those who pay $30 and over amount to 297,478.

Information regarding the variation in monthly rental, composition of the population and data on type, age, size and occupancy of family quarters is shown by diagrams on Page 30.

Fig. 6—Two Specimen Pages from the Market Survey.

is generally realized that underground conduits and conductors form a large part of distribution costs, but services and meters also are quite important items.

It is time that distribution design was reviewed carefully. A close analysis of various areas will show that perhaps construction has been too heavy in the past. Possibly distribution systems have been built too well, with too much emphasis on continuity of service, or it might be found that money would have been saved in the end if the systems had been built better in the first place. Design of this kind, "tailor-made," relies upon accurate planning information as to type of area and future needs and growth.

I believe that in the field of cost studies, especially on the distribution system, lies the greatest opportunity for the planning engineer to save real money for the Company.

Market Research and Market Surveys

I have briefiy described the more obvious functions of system planning as previously outlined and have shown some actual applications of these functions. Now, I wish to introduce a newer subject, and one of paramount importance. It is market research. It deals primarily with the determination of the quantity and the location of new prospects for the sale of electric appliances, and is definitely a part of system planning.

In our own particular case in 1931 and 1932, the general function of providing sufficient generating station and distribution capacity had been properly carried out. We were then greatly interested in and ready to start the job of determining the location of the future market for appliances in order that this market would be sold commercially and so that distribution system expenditures could be made efficiently at the proper locations where this market exists.

Early in 1932, a specific request was received from our chief executive for data regarding the social composition of the population, its distribution over the borough and data regarding its income and living habits. Some of these data were already available having been analyzed in the 1930 U. S. Census. This, however, was fragmentary and the areas covered in the breakdown were too large. Later a private company prepared a market survey covering New York City, breaking Brooklyn territory down into 25 districts and furnishing such basic information in tabular form as: "Buying Power Index," "Per Cent of Homes Owned," "Saturation of Electric Refrigerators," "Saturation of Radio Sets," "Saturation of Vacuum Cleaners," and "Saturation of Washing Machines."

These basic or raw data were analyzed and put in readily usable form by means of maps and descriptive matter and served as our best survey at the time. It was a good survey but being based on a canvass of only every twentieth family it did not present an exact picture and being a commercial undertaking, it was limited in scope. Of course, having made this progress it became desirable to learn all about our market. Hence, the study was continued.

During this time basic data were being collected on market and housing conditions in New York City by the Mayor's Committee on City Planning. The undertaking was known as the Real Property Inventory of New York. Very complete market data was thus made available as the result of a definite house to house canvass. Again it must be pointed out that this inventory furnished raw data which was only useful to the trained technician and not suited for pub-

lic consumption. This data was obtained as soon as available and the job of preparing the *Brooklyn Market Survey* was begun. The preparation of this Survey and its application to our engineering and sales promotional activities supplies the missing link in the function of system planning.

Description of Survey

A brief description of the published survey will emphasize its contents and scope. Essentially it consists of seventy-four pages and is divided into twelve sections, each section covering a specific subject and each with its distinguishing color heading. The analysis of this market of 2,700,000 people is divided into two parts. The market as a whole is analyzed by graphs and tables. The geographical distribution of the market is shown in a series of 40 colored maps dividing the city into 59 districts and 928 small census tract areas. Fig. 6 reproduces two specimen pages of the survey.

A review of the various sections will indicate the various phases of this publication.

1. Market Research

It was considered advisable to explain what market research really is and its uses so that those unfamiliar with such studies could readily apply it to their requirements.

Market research answers the questions as to when, where, how, whom and what to sell. It gives facts upon which the executives can base sound judgment. It is especially necessary where a large market is concerned so that sales efforts will be concentrated on the people who have the means to buy and to utilize the product.

2. Application of the Survey to the Market Area

Particular attention has been paid to the use of the survey for analysis of the electrical appliance market. Specific maps and charts are mentioned for promoting each major appliance such as: ranges, refrigerators, oil burners and air conditioning equipment. Sections are devoted to small household appliances and home lighting.

3. Company Services Rendered

Too little emphasis has been placed on the extra services rendered by utilities in addition to their regular function of selling electrical energy. A section of the survey is devoted to Company services, rendered without charge, in order to stress the help offered in home lighting, commercial lighting, industrial engineering, consulting service and utilization.

4. Retail Trade

In order to portray the vastness and importance of our local market, the City's retail trade has been analyzed showing the value of retail sales amounting to $1,035,000,000; of manufactured products $1,214,000,000, and retail outlets numbering 37,600.

5. Twenty-eight Communities

Further to emphasize its size and importance it is pointed out that Brooklyn has grown from a number of isolated small towns into one large city. However, the characteristics of these original small towns still exist, therefore, these districts were analyzed as to composition of the population, type of homes and principal industries.

6. Population

Total population has been analyzed as to growth and composition. Gainfully employed workers and size of households have been studied. Population movements have been shown. A significant trend in population movement was observed from the older downtown section to the newer outlying areas.

7. Rentals of Family Quarters

Income or consumer's buying power is the most desirable and at the same time the most difficult item to obtain for a market survey. Median monthly rent has been calculated for each of the 928 census tracts which may be used as a basis for determination of income.

Rentals have been analyzed by bar charts showing the number of quarters in the various brackets. An analysis of this type is of particular significance in determining the size of a potential market.

The maps showing rent in the various areas of the City are considered the most important in the survey.

8. Family Quarters

Family quarters which form a clue to the living habits of the people have been analyzed by size, geographical location, ownership and type of structure. In addition the equipment and services utilized in the home are shown. These are shown on maps for such items as, saturation and number of mechanical refrigerators, quarters without central heating plants and percentage of owner-occupied family quarters.

9. Analysis of Structures

Residential structures were analyzed as to type, age, condition and geographical distribution. A series of maps shows where good and poor areas are located, according to housing conditions. Building development is studied throughout the Borough. Areas are indicated where residential structures predominate, and where one and two-family houses predominate. Historical data for various classes of structures are given from 1912 to date. In this way the development and growth of areas may be studied.

10. Commercial Market

As an aid in directing the promotion of better commercial lighting and greater use of appliances, a study of the retail stores and commercial structures has been made. Retail stores such as, food stores, drug stores, appliance stores and the like are located by 928 areas over the City. In addition to proving of value to our business, these maps are an aid in determination of store locations and the location of distributors' warehouses.

11. Various Cities Compared

The best way to form judgment is by actual comparison. To this end Brooklyn has been compared with 19 other cities selected to give a representative list of U. S. A. cities. Housing and rentals have been compared. Significant differences were found, particularly in housing. For instance, in Brooklyn 54 per cent of the family quarters are in multi-family houses, whereas the other cities range downward to 5 per cent. Similarly, homes without either electricity or gas for lighting were found to be 50 per cent in Charleston, S. C., whereas the number is negligible in Brooklyn. Rentals likewise show contrasting results. In Brooklyn our median monthly rental amounts to $35, but in Birmingham, Ala., the comparable value is $9.

12. Summary of Market Data

With the belief that no chart is complete without its corresponding table of data, the actual values for all charts are included in this summary.

Publication and Distribution

This survey, except for the gathering of the raw data, was prepared in every respect by the engineering staff of the System Planning Division under the Electrical Engineer. All calculations were made, descriptive matter prepared, maps and pages designed and even the selection of colors and supervision of the printing were carried out by this group. An example of the work involved, is the fact that two maps on rentals required 14,000 calculations.

Careful consideration was also given to its distribution. Because of the magnitude of the project, it was decided that the Survey should be distributed by the Chief Executive. With the exception of the copies allocated for Company use, all other copies were sent to the presidents or heads of other companies and institutions. In addition to our cooperative dealers, appliance and fixture manufacturers and distributors, copies were sent to the various branches of the local government, the press, Chambers of Commerce, department stores, chain store headquarters, banks, real estate boards, laundries, large industrial consumers, local libraries, other local utilities and to the official delegates of the Third World Power Conference.

Its Reception

It is always a question just how an undertaking of this kind will be received by our customers and the general public. There is always the chance that some prejudiced individual or group may question the function of the utility in under-

taking such a job. The answer in this case is that the electric utility is the first to feel the effect of a gain or loss in general business in the community and therefore everything within reason should be done to attract new industry and population to the territory. As a matter of fact, the response from all quarters was highly gratifying and completely justified this undertaking.

Application of the Survey to System Growth and Planning

From a brief study of the record of some of the more important utilities having a high saturation of refrigerators or ranges, it appears that the sale of such appliances is influenced more by determined sales effort than by such factors as cost of electric service or degree of gas competition. Assuming this to be a fact and that continuous sales effort will ultimately result in higher energy sales, the location of the market must be ascertained in order that sales effort will not be wasted on unfruitful territories.

A market survey such as this, prepared as it was by engineers, should and does aid in formulating and carrying out system plans. In order to anticipate our future load and the location of this load, the characteristics of the population served and the movement of this population within the territory must be known. That is, in making such major improvements as overhead to underground change within a block or an area, it is necessary that the type of customer who will occupy this location in the next twenty years be anticipated and the possible revenue they will supply. The extent of such system development should be in keeping with the revenue to be received. Similar consideration should be given to new extensions, maintenance, utilization expense and, in fact, all operations of the Company. Future revenue definitely should decide Company policy and it is dependent entirely on the consumers ability to purchase appliances and utilize electric service.

Specific Applications of the Survey

Some specific applications since the release of the survey are:

1. Relocation of a district office.

2. Location of families with high purchasing power living in one and two-family houses, who will be future range prospects. This was used for the determination of type of service to be rendered such customers.

3. It aided in a study for the determination of size and quality of general meter and service equipment.

4. A low-voltage AC network grid covering twenty-five square miles, as installed in Brooklyn, presents quite a problem in the starting up of the system in case of total shutdowns. Refrigerator starting currents present a sizable load at that time and especially so when some 200,000 refrigerators have to be considered. The survey furnished the number and location of electric refrigerators on the system, to be used in a study of network sectionalization in case of system failure.

5. Used in locating range prospects in multi-family dwellings in connection with a Brooklyn home modernization movement.

Market Surveys Should Be Kept Up to Date

With the completion of the Brooklyn Market Survey the need becomes apparent for keeping it up to date. Besides interest in quantitative data it is of great importance that trends which are revealed be watched carefully and corrected periodically as time goes on. Every addition of data is not only of value in itself but increases the value of the previous data. After this survey has had a wide local circulation and its worth is proven it is felt that other utilities, chambers of commerce, merchants' associations, real estate boards, newspapers, and banks may be willing to share part of the work and expense of periodic revisions. A large mass of data is continuously available from the ordinary business, utility, and governmental records. The trend is definitely toward more specific market data and governmental and local groups will be more and more active in this field.

Aerial Surveys

In any utility engineering office there are certain tools which are indispensable to planning work. These are maps and atlases which show streets, grades and location, size and type of buildings. They are fundamental necessities when making engineering layouts but they are not enough. The character of a neighborhood is a very important item which no map can show. In small territories the basic information obtained from atlases and maps is usually supplemented by personal familiarity with sectional conditions. In a territory of eighty-one square miles, densely populated and changing rapidly, no person can be familiar with sectional conditions at all times and all places. Oblique aerial photographs of every part of the territory have been found to be eminently satisfactory in filling this need. From them an intimate mental picture of the characteristics of a particular locality can be immediately obtained. They obviate time-consuming field inspections and furnish a permanent record of actual conditions in the field. Department heads and executives too busy to make personal inspections are enabled to visualize the areas under consideration for distribution system improvements. Moreover, change in character of the various sections of a territory can be studied by comparing the latest photographs with earlier ones. The aerial survey made of Brooklyn in 1928 will be kept on file for this purpose and one copy has been placed in storage file for ten or fifteen years safekeeping. The survey now in use was made in 1935.

Conclusions

System Planning to be really effective and useful must be sponsored by the chief executive, developed by experienced engineers and must be accepted and carried out by all parts of the organization. Complete cooperation of the commercial group is imperative in order that sales efforts will be applied to the productive areas indicated by engineering studies, and so that engineers can efficiently develop the distribution system where these sales efforts are being applied.

Future electric rates must be determined from future operating expenses. A ten-year operating and construction program is essential so that future expenses may be intelligently forecast and so that annual system improvements will definitely fit into a predetermined plan.

Planning engineers should be concentrating their efforts on system cost studies in order to reduce the cost of distribution, which is the largest item in cost of service.

Since engineers must know their territory for purposes of load forecasting and system analysis, they automatically become the logical group to make market surveys. This missing link in our planning is important at this time especially when we are approaching a period of prosperity. We must make sure that a proper share of the increasing national income goes for electrical appliances and apparatus. Engineers must not only develop the planning technique but must turn salesman and spread the gospel of the scientific approach to sales and management problems.

The planning engineer and his staff will save many times their annual expense, in better design and avoidance of costly mistakes.

As an assistance to others who may be interested in developing system planning, a bibliography on this subject has been prepared and a few copies are available to those who may have a real need for them.

The Electrification of American Agriculture

By H. E. Dexter

General Commercial Manager, Central Hudson Gas and Electric Corporation, Poughkeepsie, N. Y.

A Talk Before a Meeting of the American Society of Agricultural Engineers, Skytop, Pa.

THE "Electrification of American Agriculture" is a real broad subject for anyone to attempt to discuss. For my purpose, I am going to assume that we mean for this present time, at least, the harnessing of this real servant, "Electricity," to most of the many, many jobs which must be done daily on our American farms. You engineers who have lived on farms, and all the rest of you who, of course, claim to have lived there, will agree with me that it is most desirable that something be harnessed to these jobs. To the lighting job, the heating job, the cooling job, the pumping job, switch, switch, switch all day long, 24 hours of continuous farm and farm home labor—call it farm relief, back relief, relief for the feet—it is the greatest single contribution made available to the American farmer in your generation and mine.

Agreed as we are that here is one of the farmer's greatest assets, why then, we ask, should there be any problem ahead of us in bringing about its use? Is it not enough to make the stuff available to him? Will he not use it freely without our further help?

Perhaps the correct answer may be arrived at by reviewing what has happened in our city areas, where electricity has been available for fifteen to twenty years at costs which would permit everyone to have good lighting, and permit approximately 15 per cent of the customers to have complete electrification. What has been the result? Perhaps 10 per cent have good lighting today, and out of the 15 per cent that can afford complete electrification, less than 1 per cent actually have it. What is the answer? It is not lack of effort on the part of the selling organization, but a combination of the time required to introduce a new line of equipment, and the lack of proper tools for the customer to make use of electricity. For example, in the case of lighting, the reason that only 10 per cent of the city customers have good lighting is the lack, until recently, of lamps which would do a good lighting job for a reasonable price. It has taken ten years to produce a lamp that could be sold for under $3.00 and still do a good lighting job.

And so, if it is granted that farmers will not flock to the nearest electrical dealer to purchase all the sundry gadgets to quickly electrify all of his operations, may we not well ask ourselves why he will not?

I believe there are three principal reasons why this happy solution will never come about. The first reason is that in order to become electrified, the American farmer must have tools. You gentlemen assembled here are, I assume, inventors, designers, manufacturers, and as agricultural engineers, you are mainly interested in applying your genius and your labor to the design of farm tools. And may I say, without hurting your feelings too much, that the tools you have given Mr. Farmer for his electrical servant to operate have been, to put it mildly, not too satisfactory. My reasons for saying this can best be explained perhaps by asking a few questions: How did you "bring out" the present-day electric brooder? Did you apply long hours of research to the problem of brooding chicks electrically? Or did you buy a couple of second-hand stove or oil brooders, wrap a heating element and 50 cents worth of insulation around it and announce the "newest thing in chick brooding"? Where did the present-day electric range come from and how long was it in getting here? Well, it is a direct descendant, believe it or not, from the farm kitchen wood range and it has been 35 years in getting right back home to that same kitchen. Now why did it take all that time to arrive? Let me ask you this—did the engineer make long and exhaustive studies of cooking the farmer's food and build an electrical tool to cook it? He did not—he worked for years and years to adapt the old wood stove to using electricity as a source of energy.

And the electric water heater! Who is the man who has made an exhaustive study of the farmer's water heater problem and today has the answer to this problem? Whoever he may be, he is the man I should like to meet before the day is ended. Frankly, I do not think this man yet lives. If you will pardon a reference to my own company, may I say that right now we are groping around for an answer to this problem. If you think it is solved with a 20, 30 or 50 gallon heater in the cellar, then you do not know your farm.

The dairy barn water heater is another example of a specific water heater service. The first heaters to be installed in my territory were manufactured by a fairly reputable manufacturer. They were no sooner in than the elements began to burn out because the farmer would forget to turn off the heater after the water had been withdrawn. Then the dealer installed time clocks to shut off the heater and save the elements, but this was only a makeshift, and finally the manufacturers replaced the heater with the present design. Altogether, it took four years of experimenting on the customer's premises to build a fairly satisfactory dairy barn water heater.

And going back to the barn again. What about the milk cooler? Where did it come from? Did some agricultural research engineer burn midnight oil studying the farmer's milk cooling problem and design a tool for this job? I predict that many more milk coolers would be in use today if this had been the case.

We can cite many, many examples of this kind to convince you that a real job of building electric tools for the farm has never been done. Too much guess work, cut and try, and far too much time has been lost in this field. The farm simply cannot be electrified without electrical tools. We do have many good tools, of course, but we need many more.

Every customer knows that the cost of developing new equipment is buried in his cost of tools and recognizes it as a reasonable charge. However, he does not like to have his farm or his house used as a testing laboratory at his expense. This sort of development work should

be carried out before it reaches the ultimate user, and the customer, when he spends his good money, should expect and receive a reasonably satisfactory tool in return.

The second thing that must be done to encourage farm electrification is to provide the farmer with a 24-hour, 365-day a year service at a cost commensurate with his income.

This is, to a large extent, a utility company problem, and as a utility company man, may I say that in the area represented by the group present here, there are extension plans so that electric service can very generally be made available to any good farm that is likely to remain permanently as a farm, at a cost which the farmer can afford to pay. Generally speaking, under these plans service can be extended half a mile from existing lines and still be within the reach of what the good farmer can afford to pay for this kind of service provided he equips his farm with the necessary electrical tools to make use of it. Naturally, the average cost of electricity decreases as the farmer's use of it increases.

The rate under which electricity is sold to the farmer should be simple, understandable, and with a minimum number of special provisions such as off-peak features and demand charges. However, electricity supplied to the farm is usually used at a considerable distance from its source, which makes it doubly important that the farmer use electricity in a way that will create as low a demand upon the line as possible. This is an item which the agricultural engineer, in designing his electrical tools, and the college research engineer, should bear in mind in all of their work with the farmer. As an example, we recently had a well-to-do farmer come into our office and insist upon a 35 hp installation to take care of ensilage cutting, so that he could rush the job through in a few hours and be through with it. We showed this gentleman several installations that were working entirely satisfactorily with 7½ hp motors, but in spite of this he insisted upon the larger unit. We had no particular objection to selling this man electricity for any size unit he wanted to operate, provided he was willing to pay the extra cost for this special service. In this particular instance it would have cost, roughly, $2,400 more to supply this farmer with capacity for a 35 hp motor which would be used only a portion of each day for perhaps one or two weeks a year. His present service was entirely adequate to handle the same job if carried out with the 7½ hp installation. If a farmer desires installations of this kind or must have them, naturally he must expect to pay a higher cost, and economically it probably would be cheaper for him to do this work with his gasoline tractor rather than attempt to do it electrically.

Rural line construction is an item that must be carefully considered in farm electrification. It is vitally important that lines be built with due regard to safety, economy of operation, and to give continuous service. I am all for the man who can build a good rural line for a low price. However, there is no economy in building a rural line for a low price and have it blow down in the first good storm. Simple forms of construction can be used that are low in price and still rugged. For example, on single phase lines with a common neutral a single phase wire can be run on top of the pole with the ground wire on the side of the pole. It's simple, inexpensive, rugged, and will do the work. The farmer must have continuous service. He needs better service than any of our city customers. In the brooding and hatching season he requires 24-hour-a-day service, and every hour of the day he requires service for some purpose. If he uses electricity to cook with and it fails, he hasn't a delicatessen or a restaurant to run to. If it happens at milking time and the farmer has a lot of cattle to milk, he is placed in a difficult position. If you do not believe that this is a serious point to the farmer, try some time to get a period during the day or night for a predetermined interruption for the purpose of making repairs to a line, and see the difficulty. When electric service goes out in a rural area today, the water pumps stop, the gasoline filling station pumps are out, lights go out, cooking stops, and many other farm, home, and community operations cease. Electricity, once it makes its entrance into the farm, becomes almost like our hearts. It goes about its work quietly, we do not realize we have it until it stops, and when it does stop it paralyzes our entire system.

Capacity is another item that should be given real consideration in building rural lines; 20,000 to 25,000 kilowatt-hours annually, with 7½-10 kw demand is a possible load with the electric equipment now commercially usable on the farm, and certainly some margin should be allowed for the new uses that are certain to develop.

It costs money to rebuild a rural line, or for that matter, any other kind of a distribution line. Such costs are ultimately reflected in the cost of the commodity—in this case, electricity. Let us have sufficient faith in this wonderful servant to believe that the farmer will eventually use it very liberally, and then build our lines to take care of his needs for a reasonable number of years in the future.

The past experience of many companies should be enough to make us stop, look and listen before we underestimate the future possibilities of the farmer. The first lines extended outside of city limits were run out purely to take care of the lighting load. As a matter of fact, for a number of years engineers in the business of generating and distributing electricity fought battles with the customer and the commercial people against selling electric ranges, wholly on the theory that the business was unprofitable. Many of these early lines today have been built up to capacity, and in many instances have been rebuilt once or twice, so that those of us who have anything to do with farm electrification today should try to avoid this particular error of building too small lines for supplying the rural areas.

In our particular case we started in with 2300 v. farm lines. This was changed to 4600 v., and we have now reinforced this system with additional feeders.

The third proposition confronting us is the problem of developing new uses. Logically, it seems to me, this job falls to the college research man. This man rides in the saddle for this job. He knows farming intimately. As an engineer he understands electricity and its many phases; as a research worker he has laboratories and equipment at his command. He is in touch constantly with farmers on their farms, with manufacturers, and with utility men. And in many cases he has funds provided for his work, the source of which is not directly dependent on immediate success of his efforts. It is to this man we must look to speed up the great potential possibilities for putting the shoulder of this great giant really to the task of turning the wheels of agriculture.

Among the items that I am thinking about is the electric tractor. It is on its way—of that I am sure, as I can recall

a demonstration I witnessed several years ago. At the time of the demonstration this electric tractor had been idle all winter in an open front shed with four gasoline tractors. The only care that the electric tractor had received was to keep the battery charged. Without further attention the operator climbed on the seat on the day of the demonstration and put it through its paces to the astonishment of the farm superintendent who had charge of the four gasoline tractors. The superintendent stated at that time that it would be impossible to take out his gasoline tractors without a careful going over. This portion of the farm market is for the future, but it is a market that will eventually be opened up.

Following a summer of such intense drought as we have just witnessed, it is impossible to speak of electrified farms without asking why electricity should not go to work in a big way to relieve this situation. In some sections I am told it even pays to irrigate pasture lands. Why then should we not, here in the Northeast at least, irrigate many of our cash crops and even alfalfa and corn?

Drought is a terrible thing for farmers to face year after year. I am told of a large dairyman in our section who milks 120 cows, who will have all of his hay fed up by January 1st. He is facing five long months of cash outlay for roughage to feed that hungry horde. His alternative is to sell part or all of his selected animals. And yet we had water round about us—in our rivers and streams and in our soil and rocks. Why should we go without it when it is really only a little problem in transportation?

We are now witnessing the development of the use of light in the farm field. It is developing on two broad and divergent fields—the one to create, the other to destroy. Who can predict the really revolutionary developments to come when electricity really goes to work as an ally to old "Sol"?

And so we could go on and on into the future. But sufficient to say that it is to the research engineers in agriculture, chemistry and physics that we look to speed these new uses from the fantastic to the practical.

Electrifying American Agriculture is not, of course, entirely in the hands of the groups you gentlemen here represent. We must have real help from others. Scientists in this field can and will perhaps make truly great contributions. Economists will be heard from, for after all the one greatest of all questions—what will the farmer use for money—may be in his lap to solve, and until he does, efforts along other lines may be dwarfed to insignificance.

And so I look for the solution of this great task to be found in a big cooperative movement which will successfully coordinate the agricultural engineer who designs the equipment, the college research staffs, the equipment manufacturers, the extension bureau that spreads this information throughout our farm area, the various credit agencies that may assist the farmer in his need for finances to purchase this equipment, the farm economist, and the people who actually go out in the field and sell the equipment to the farmer. It is only through such coordinated effort that we can expect to do a real job in electrifying American Agriculture.

Regional Integration in Foreign Countries

(Continued from page 448)

supreme proprietor of the electric system, with the right to plan the system, allocate power to various industries, and regulate the relations between distributors and consumers."

Russia

The Krzhizhanovsky Power Institute of the USSR Academy of Sciences prepared an elaborate report for submittal to the World Power Conference describing the development of electrification in the USSR.

Regional planning is an essential feature of the basic "Goelro" plan of 1920 and its subsequent modifications. Integration was fully provided for, although there was relatively little to integrate compared with the magnitude of new projects comprised in the plan. The report states the formula followed in the following terms[11]:

"The creation of a unified electric power system covering the whole country, including the production, transmission and consumption of energy on a single technical and organizational foundation. The necessary conditions for this are real planned economy and planned electrification, organically interrelated."

China

A paper submitted by the Electric Utility Regulating Board of the National Construction Commission on "Public Regulation" states the policy of the Chinese government, as follows:

"The national policy of the Chinese National Government in dealing with public utilities of monopolistic character favors public development and public operation, as is manifested in the draft of the Constitution recently promulgated. The electric utility, being one of such utilities, should, therefore, in principle, be operated by public agencies."

However, at the present time about 95 per cent of all electric utilities are priviately owned and operated. The Electric Utility Regulating Board exercises regulatory functions. It also conducts studies for regional developments, development of water powers and rural service, none of which, however, is being put into active operation at this time.

Summary

The World Power Conference foreign contributions as a whole do not report any experience with regional integration as defined in the American Committee's program, namely, "single systems capable of being operated as a unit for the complete service of a definite geographical area," or as further developed in Mr. Manly's paper, which makes governmental intervention an indispensable feature. In fact, there do not appear to be any examples of this kind in Western Europe. High tension networks are well developed with other facilities for bulk transmission and interchange of electricity, but they are apparently all devoted to the practical services and benefits they may afford and they are obviously not the product of any planned economy. In the electrically more backward countries of Eastern Europe—in Bulgaria, Slovakia, Moravia and the USSR and in China—there appear to be developments of the type that was apparently contemplated when the topic "Regional Integration" was set up.

[11] "Electric Power Development in the USSR," Moscow, 1936, p. 16.

Influence of Climate and Rates on Electric Refrigerator Sales

By Warren M. Persons
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AUTHOR'S NOTE—The present study attempts to appraise the relative importance, throughout the United States—with its wide dispersion of summer temperatures, winter temperatures, rainfall, rates for electric energy, and incomes—of various factors influencing the purchase of electric refrigerators. *In this study, however, an important factor has been omitted—the varying intensity throughout the country of advertising and sales effort, for which the author does not have statistical data.*

The study does not pretend to offer a basis for the appraisal of the soundness of refrigerator advertising programs, sales effort and success. To be sure, the data used in the present study plus certain additional data afford the basis for such an appraisal, but such data have not here been marshalled to throw light on those specific subjects. Such data are essential to the allotment of sales quotas.

IN the first eight months of 1936 in this country 1,753,632 domestic electric refrigerators were sold as compared with 1,369,861 units during the same period last year, at an increased retail valuation of 28 per cent.

In 1935 purchasers paid $264,000,000 for 1,590,023 domestic electric refrigerators. In that year families in electrically wired homes in city, town and country bought nearly as many refrigerators as were in operation on December 31, 1929.

On December 31, 1935, 7,250,000 electric refrigerators were connected to electric circuits, out of a total of 21,235,231 wired city homes and farm houses in the United States at the beginning of that year.

During the depression years 1930-1935, 6,596,096 electric refrigerators were bought by American consumers. People paid $1,264,000,000 for electric refrigerators during the deepest and longest business depression in our history.

* * *

Why did people, while severely curtailing their budgets in every other direction, pay a billion and a quarter dollars for electric refrigerators?

First, the use value to them of automatic, carefree, reliable, efficient refrigeration stands high in their list of values. Their demands for a device that will satisfy their refrigeration wants are urgent.

Second, American research engineers and manufacturers of refrigerators, now leading the world in this field, are offering prospective purchasers marvelously efficient electric refrigerators.

Third, people, being realists, insist on being shown that the electric refrigerators they buy will render the services they demand. Prospective purchasers can now get favorable testimony from millions of owners, as well as engineers' reports of tests.

Fourth, the prices of electric refrigerators have been drastically reduced since 1928. In 1935 the smaller popular model sold at retail for $115 as compared with $235 in 1928, while the larger popular model sold for $180 as compared with $335.

Fifth, within the actual range of rates for electric current which has ruled in most of the United States in recent years the cost of operating electric refrigerators, together with lighting and miscellaneous electric appliances, has been only $4 to $6 a month for the 100 kilowatthours required. The total monthly cost of electric refrigerator service is less than the cost of natural ice alone in most sections of the country.

Sixth, the economy of using electric refrigeration is unusually great in the following geographical areas of the United States (see Map 1):

(a) From the Gulf of Mexico north to a line from Maryland on the east to Missouri on the west: this section has hot summer temperatures and inadequate or no local supply of natural ice from the previous winter.

(b) From the Mexican border on the south to the Canadian line on the north: this section has high summer temperatures, relatively low rainfall and deficient lakes and rivers for spring houses and for yielding widely distributed natural ice for summer use.

Seventh, the use of electric current for refrigeration is economical in the remaining sections of the United States, even where summers are relatively cool and natural ice abundant. Consider the characteristics of these areas of the country:

(a) Massachusetts, New York, Delaware on the Atlantic Coast to Illinois on the Mississippi River: in these states summers are moderately hot and the relative well-being of the population is high. Their demands for refrigerators are urgent, but less so than in the south and in the dry plains sections of the country.

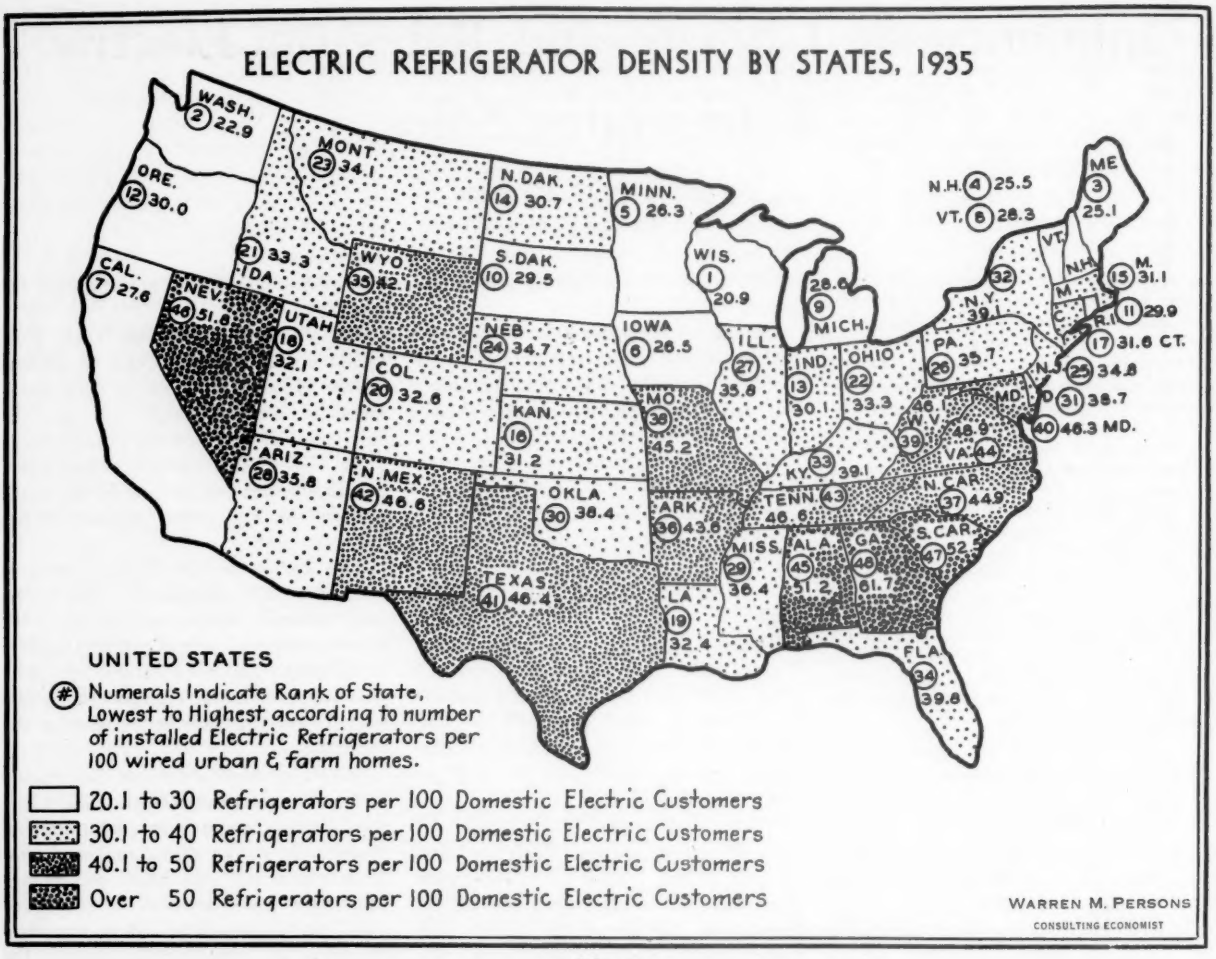
(b) Northern New England west to Wisconsin and Minnesota: this is the cool summer resort section of fresh water lakes and rivers yielding widely distributed supplies of natural ice. The necessity for electric refrigerators is less urgent than that in other sections of the country.

(c) The three states on the Pacific Coast—Washington, Oregon and California: these states have cool summers, warm winters, a narrow range of temperatures during the year, and mountain lakes where natural ice is obtainable. Regardless of relatively low electric rates in these states—among the lowest in the country—the demand for electric refrigeration, even in the densely populated areas, is not much more urgent, if any, than in the summer resort zone from Maine to Minnesota.

Eighth, the levels of rates for electric current, as those rates have ruled in recent years, have been relatively unimportant—as compared with prices of refrigerators, high summer temperatures, low rainfall, and purchasing power of consumers—in affecting refrigerator sales. This is indicated by the fact that in 1931 to 1933 declining rates for electricity failed to result in increased consumption of current for "lighting and appliances other than radios and refrigerators, while the current used by refrigerators and radios expanded enormously.

From 1931 to 1934 increased consumption of energy by refrigerators and radios was sufficient to convert an otherwise downward trend in total domestic consumption of electricity into an upward trend.

The same utility holding companies



Map 1

serve both Michigan and Georgia (the (Commonwealth and Southern), and Wisconsin and Missouri (North American Co.). The weighted average Michigan bill for 100 kilowatthours is $3.70 as compared with $4.20 in Georgia, according to the Rate Survey of the Federal Power Commission. Yet in Michigan the density of refrigerators in use as compared with homes electrically wired is 28.6 per cent as compared with 61.7 per cent in Georgia. In Nevada the average bill is $5.38 and the percentage density is 51.8 per cent; in Washington, the average bill is $3.69 and the density 22.9 per cent. In Wisconsin the average bill is $4.30 and the density 20.9 per cent; in Missouri the average bill is $4.07 and the density 45.2 per cent. In the United States as a whole there is actually a slight positive correlation between average rates for current and electric refrigerator density.

* * *

In my survey, just summarized, the factors that loom large are (1) the high use value of refrigerators, (2) the dependability of present-day refrigerators, (3) the drastically decreased retail prices of refrigerators during the last eight years, and (4) the stimulus of hot summer temperatures to purchase this mechanism for preserving perishable foods and for providing cool drinks. The actual influence of declining rates for electric current was relatively negligible in stimulating sales of refrigerators.

Various governmental and other theorists, not taking the trouble to check their hypotheses with facts, have proclaimed that high electric rates have been and are the leading obstacle to the purchase and use of electric refrigerators. Manufacturers and merchandisers of electric refrigerators, however, have found in actual practice that electric rates were not an important item in sales resistance.

It is the intent of the writer to utilize the extensive data available and let the properly marshaled facts speak for themselves.

The accompanying bar diagram (Fig. 1) sets forth the typical seasonal variation in monthly sales of refrigerators, based on data for 1931-35. The outstanding feature of the diagram is the large volume of sales from February to July each year, anticipating and accompanying hot weather. Nearly 80 per cent of annual sales occur during these six months.

* * *

Now let us consider, in order, two questions: First, do the densities of ownership of domestic refrigerators relative to wired homes in the various states of the Union fluctuate directly with the degrees of July temperatures in those states? Second, do these densities of ownership fluctuate inversely with rates for electric energy in these states?

The accompanying map (Map 1) presents graphically the various states shaded according to the percentages obtained for each state by dividing "the number of domestic electric refrigerators in occupied wired homes at the end of

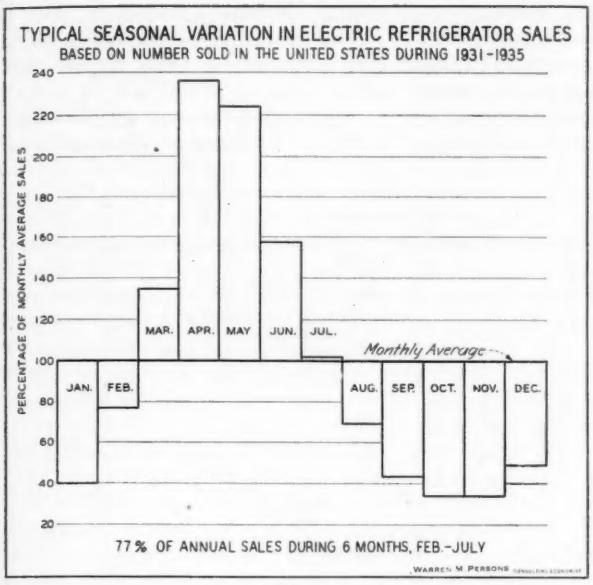


Fig. 1

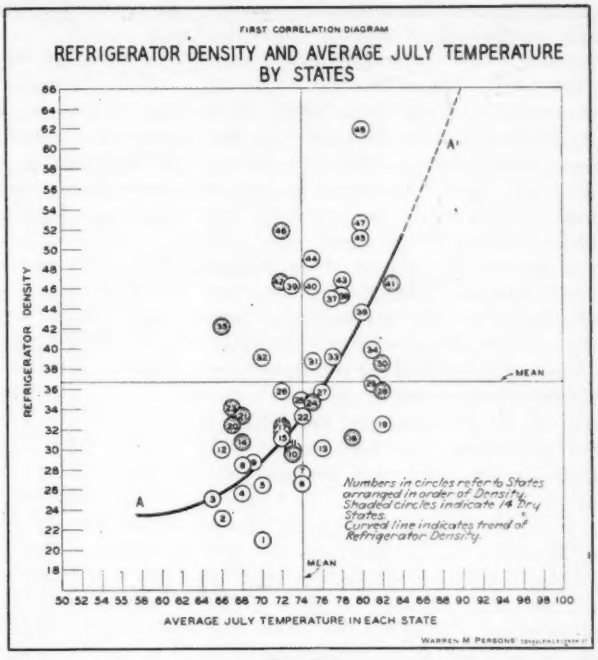

FIRST CORRELATION DIAGRAM
REFRIGERATOR DENSITY AND AVERAGE JULY TEMPERATURE
BY STATES
REFRIGERATOR DENSITY
AVERAGE JULY TEMPERATURE IN EACH STATE
A
A'
MEAN
Numbers in circles refer to States arranged in order of Density. Shaded circles indicate 14 Dry States. Curved line indicates trend of Refrigerator Density.
WARREN M. PERSONS

Fig. 2

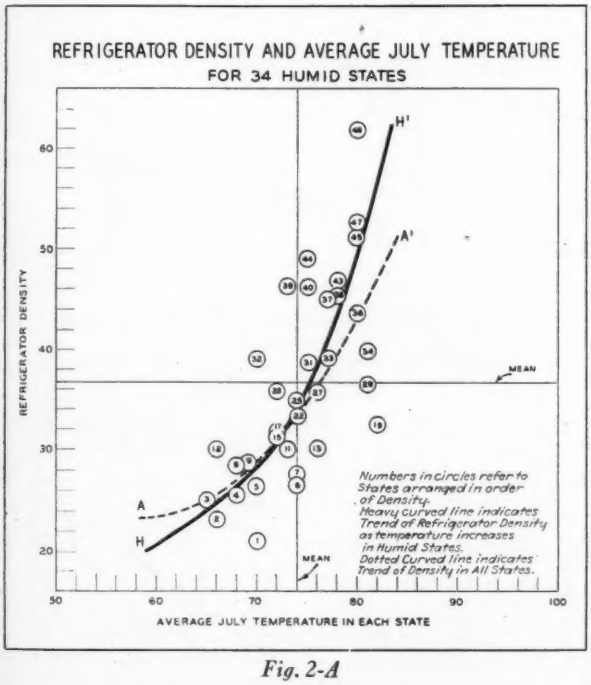

REFRIGERATOR DENSITY AND AVERAGE JULY TEMPERATURE
FOR 34 HUMID STATES
REFRIGERATOR DENSITY
AVERAGE JULY TEMPERATURE IN EACH STATE
H
H'
A
A'
MEAN
Numbers in circles refer to States arranged in order of Density. Heavy curved line indicates Trend of Refrigerator Density as temperature increases in Humid States. Dotted Curved line indicates Trend of Density in All States.

Fig. 2-A

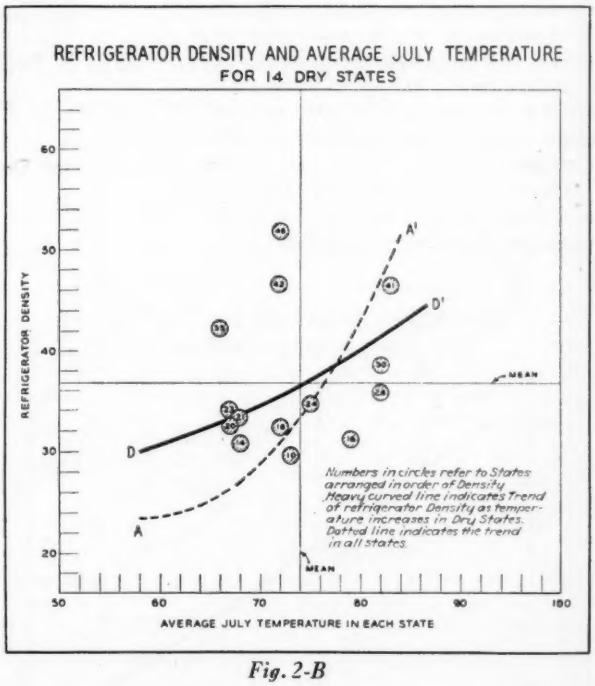

REFRIGERATOR DENSITY AND AVERAGE JULY TEMPERATURE
FOR 14 DRY STATES
REFRIGERATOR DENSITY
AVERAGE JULY TEMPERATURE IN EACH STATE
A
A'
D
D'
MEAN
Numbers in circles refer to States arranged in order of Density. Heavy curved line indicates Trend of refrigerator Density as temperature increases in Dry States. Dotted line indicates the trend in all states.

Fig. 2-B

1935" by "the total number of domestic customers in that year." These percentages are given, in the map, for each state. The states were arrayed in order of magnitude of the density percentages—lowest to highest—and classified into four groups. The states of each of the four groups are stippled alike in the map. The numbers in circles indicate the order of density—lowest to highest.

Comment on this map has already been made on the preceding pages. We are now interested in making a more intensive study of the density percentages for the states, each percentage being paired with the average July temperature, as given by the Federal Weather Bureau, for the appropriate state.

* * *

In the two accompanying sets of correlation diagrams the refrigeration density figures for states are paired, first, with average July temperatures of those states (Fig. 2) and, second, with average electric bills for 100 kilowatthours for the state as published recently in the rate survey of the Federal Power Commission (Fig. 3). In both diagrams the density percentages are measured vertically while, in the first diagram, July

temperatures are measured horizontally and, in the second, bills for 100 kilowatthours are thus measured. Each small circle, located by each pair of corresponding items for a given state, represents the state designated by the numeral in the circle. Thus, Wisconsin, with the lowest refrigerator density, is numbered "1" and Georgia, with the highest density, is numbered "48."

From the first diagram it is obvious that refrigeration density is directly associated with July temperatures, since the small circles are scattered along the ascending diagonal of the rectangle from the lower left corner to the upper right. This means that in general low densities are paired with low temperatures and high densities with high summer temperatures.

From the second diagram, based on refrigeration density and bills for 100 kilowatthours, it is obvious that there is no systematic grouping of black circles along either diagonal, or any other line or curve. This indicates that refrigeration densities and electric bills have no significant association, direct or inverse. If there be an inverse relationship between the two variables—i.e. as electric rates are higher, density is lower—it is small in comparison with other relationships, such as that shown in the first diagram.

Our conclusions from the first diagram indicate that there is a "law of the variation of refrigeration density by states with July average temperatures of such states."

* * *

Our conclusions from the first diagram also suggest that refrigeration engineers and manufacturers should design and manufacture for efficiency of refrigerators during long continued periods of high temperatures—such as three or four consecutive weeks of 110° or even 120° heat, such as certain portions of the United States experienced during the summers of 1934 and 1936.

This, the leaders of the industry have long realized. In 1934, as just indicated, occurred a real test of electric refrigerators—a test to which certain makes of refrigerators succumbed, but

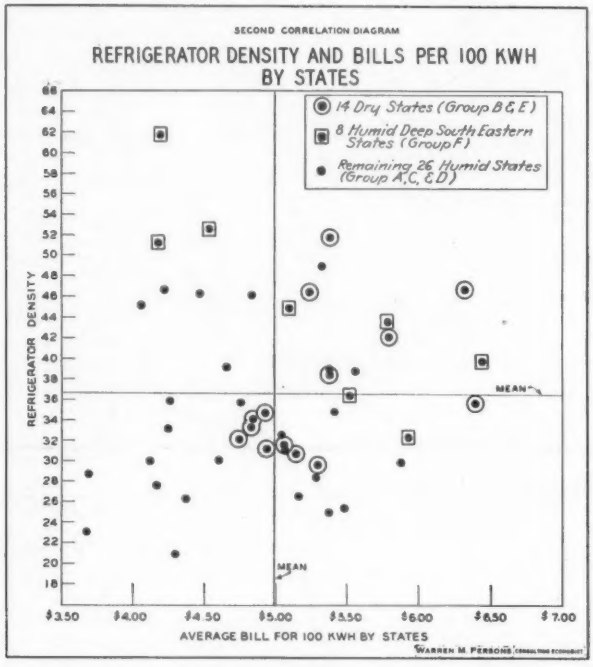

SECOND CORRELATION DIAGRAM
REFRIGERATOR DENSITY AND BILLS PER 100 KWH BY STATES
14 Dry States (Group B,C,E)
8 Humid Deep South Eastern States (Group F)
Remaining 26 Humid States (Group A,C,E,D)
REFRIGERATOR DENSITY
MEAN
MEAN
$3.50 $4.00 $4.50 $5.00 $5.50 $6.00 $6.50 $7.00
AVERAGE BILL FOR 100 KWH BY STATES
WARREN M. PERSONS

Fig. 3

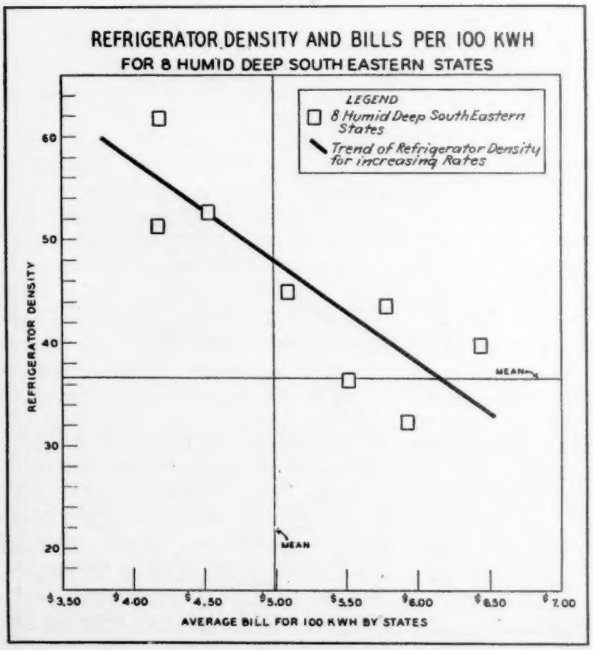

REFRIGERATOR DENSITY AND BILLS PER 100 KWH
FOR 8 HUMID DEEP SOUTH EASTERN STATES
LEGEND
8 Humid Deep South Eastern States
Trend of Refrigerator Density for increasing Rates
REFRIGERATOR DENSITY
MEAN
MEAN
$3.50 $4.00 $4.50 $5.00 $5.50 $6.00 $6.50 $7.00
AVERAGE BILL FOR 100 KWH BY STATES

Fig. 3-A

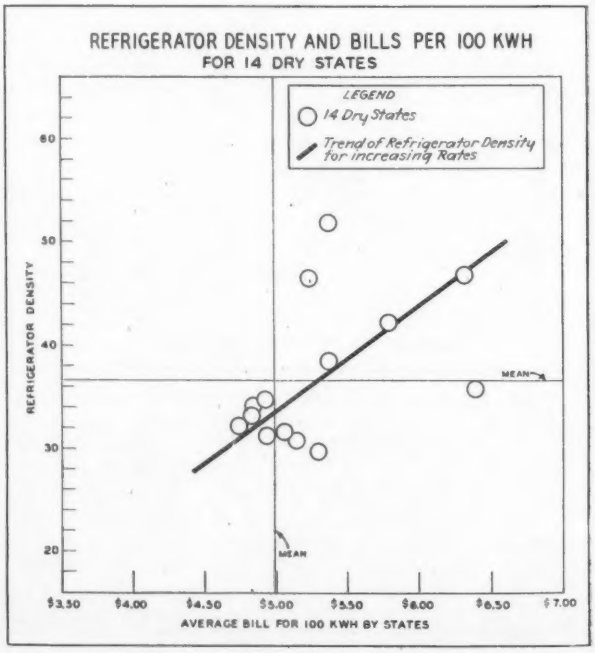

REFRIGERATOR DENSITY AND BILLS PER 100 KWH
FOR 14 DRY STATES
LEGEND
14 Dry States
Trend of Refrigerator Density for increasing Rates
REFRIGERATOR DENSITY
MEAN
MEAN
$3.50 $4.00 $4.50 $5.00 $5.50 $6.00 $6.50 $7.00
AVERAGE BILL FOR 100 KWH BY STATES

Fig. 3-B

others came through with flying colors. Manufacturers found in 1934 that it does not pay to skimp compressor units in order to reduce operating costs for current during "normal" periods of air temperatures.

* * *

There is much room for expansion of the domestic electric refrigerator market —in the cooler as well as in the hotter states. The residents in the northern half of the nation are learning that round-the-year refrigeration is necessary to maintain the uniform low temperatures required to prevent food spoilage. They are beginning to realize that they do not reap the full returns from their refrigerator investment if the refrigerator remains idle part of the year. In the cooler states it is not unreasonable to expect 40 or 50 per cent electric refrigerator density before many years pass, while in the hotter states 70 or 80 per cent density appears to be not far distant. As for sales abroad, American manufacturers have hardly scratched the wide market in the tropical, subtropical and temperate zones.

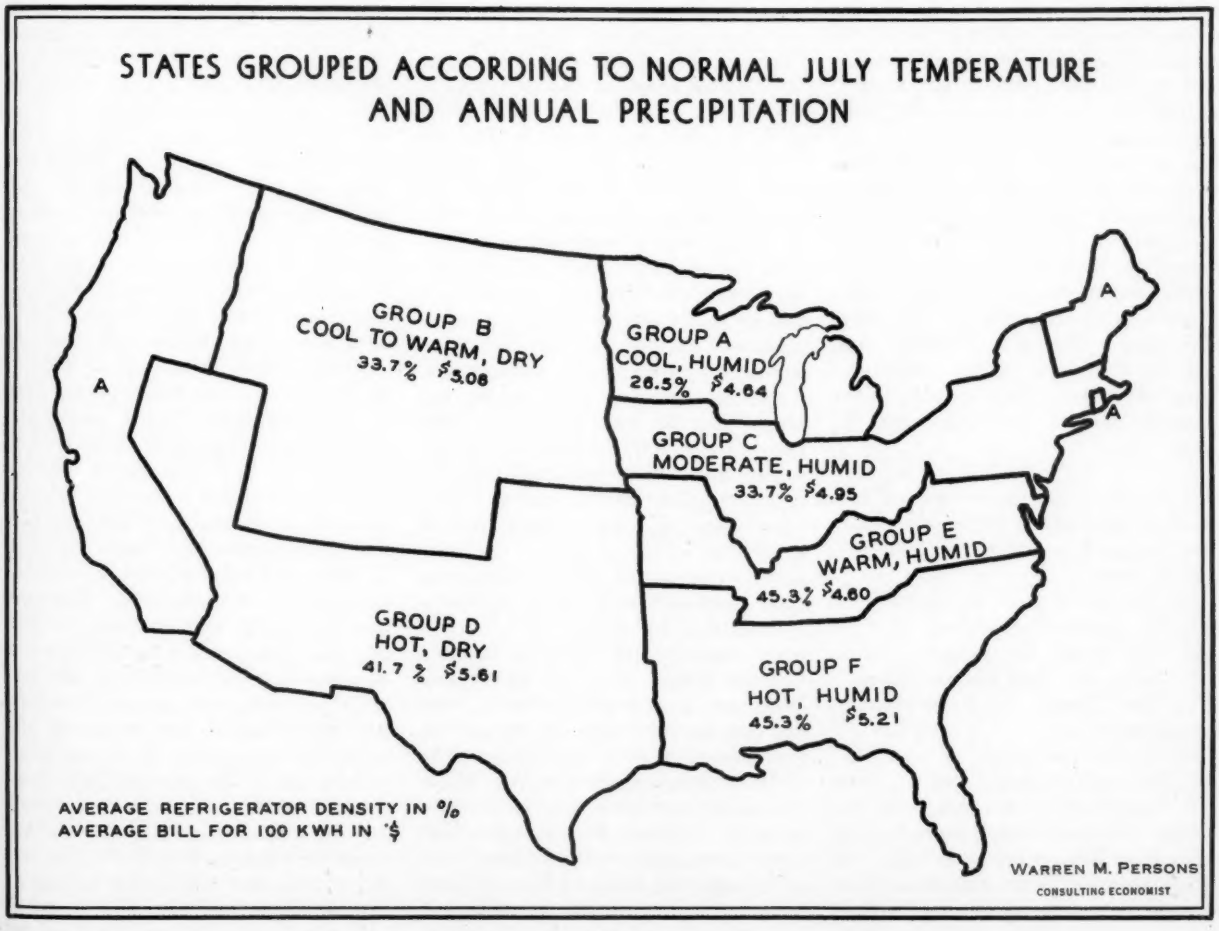
Why do people buy refrigeration? The answer is so simple and obvious that it has been overlooked by an appreciable number of experts, governmental and other, and even manufacturers. People buy refrigeration because the weather in the United States is most uncomfortably hot in summer—and mechanical refrigerators provide the best means, by automatic temperature control, of preserving perishable foods and furnishing refreshing drinks when the mercury threatens to break through the tops of our thermometers.

Correlation and Causation

Let me present, at this point, an analysis of my thinking, concerning inferences from statistical comparisons of (a) refrigerator density and temperature by states, (b) refrigerator density and average bills for 100 kwhr by states and (c) refrigerator density and income groups. The figures show (1) that state refrigerator density and temperature, on the whole, increase and decrease together, (2) that refrigerator density is higher on the whole for states having higher electric energy rates, and (3) that a larger percentage of families in the higher income groups buy and use electric refrigerators than do families in lower income groups. The figures properly combined and presented in maps and charts reveal the facts as to the correspondence or lack of correspondence —or the "degree of correlation," as the technical statisticians would say.

But "degrees of correlation" indicate absolutely nothing as to causation. A conclusion as to cause and effect is an inference based upon reasoning which, to be realistic, must be in accord with all the facts, including non-statistical facts.

Let me illustrate. Since the 1870's and 1880's the number of telephones connected at the end of each year, the total yearly value of electrical machinery and equipment manufactured, and the total production of electrical energy



Map 2

measured in kilowatthours have increased together at an extremely rapid rate. These are facts. The correlation among these three series of annual figures is almost perfect. Do these figures compel the inference that the movement of one series of figures *causes* similar movements in the others? If so, which is cause and which is effect? The figures themselves give no indication. This must come from one's reasoning. Further, are we compelled to limit our reasoning of our choice of causes from one of the three particular series compared? Not at all. These three series are merely our original selection of series to be compared. We may have omitted a more significant series. Also, the real cause may not be expressible in figures, may not be statistically measurable. In the case used as an illustration, it is my belief that the real cause is "the growth of knowledge concerning the generation of electricity, what can be done with that form of energy, devising machinery to produce electricity, inventing and manufacturing and merchandising appliances to harness and utilize that energy to satisfy our wants—in brief, the fruits of research in electricity and allied fields, still briefer, the genius of our people." In fact, my "statistical inference" from the like upward movements of the figures of telephones connected, electrical machinery and equipment manufactured, and electric energy produced is that these three sets of figures are merely three aspects of the same underlying cause—activity and success of our people in electrical research, manufacture, and merchandising. The figures reflect and measure the vigor of the underlying cause. However, the particular things measured by the figures are not the cause.

* * *

A further illustration even more pertinent to the problem we are discussing, "why people buy electric refrigerators," will be given.

Let us group the 48 states (see Map 2) described as follows:

A. Ten humid, cool states.

B. Eight dry, cool-to-warm states.

C. Ten humid moderate-temperatured states.

D. Six dry, hot states.

E. Six humid, warm states.

F. Eight humid, hot states.

Now find the average percentage of negro population to total population for the states in each of the six groups. Also take the figures for the average refrigerator density for the states of each of the six groups—the number of electric refrigerator owners per 100 electrically wired homes. Now compare the two sets of figures. Here they are:

Humid States	Negro Population Density	Electrical Refrigerator Density
A	8/10 of 1%	26.5
C	4.3%	34.2
E	13.9%	45.3
F	36.2%	45.3

Dry States	Negro Population Density	Electrical Refrigerator Density
B	4/10 of 1%	33.7
D	4.9%	41.7

Here we find very high positive correlation, as the statistician would express it, between the density of negro population and the use of electric refrigerators. Is either the cause of the other? My inference is, that it *happens* that both negroes and refrigerators are attracted to hot climates—not that negroes in wired houses buy refrigerators more eagerly than do whites in the same income groups.

Likewise, we found from the statistics that, on the whole, the higher the electric energy rates for 100 kilowatthours the higher is the refrigerator density. On the surface such a relationship may appear impossible. If you have been convinced in advance that low energy rates *induce* people to buy refrigerators, you would probably say "the figures lie." We find upon investigation of this result that higher-than-average energy rates rule in the dry sections of the country, because of scarcity of water for the production of power, and in hot sections where water power is scarce and fuel expensive. (See Figs. 2A, 2B, 3A and 3B.) My inference from this set of established facts is that the *heat* stimulates people to buy electric refrigerators, not because energy rates are higher, but rather that the heat, and human reactions to the heat, impel them to buy refrigerators. More specifically, the actually prevailing electric rates and actually existing prices for delivered artificial or natural ice make electric refrigerators just as economical a purchase, and make them as economical to operate in most states as ice refrigerators.

For instance, the privately operated Lakeside Steam Plant at Milwaukee, Wisconsin, generates electricity at costs that compare favorably with those of the most efficient plants in the country. The plant is built on the shore of Lake Michigan and thus has a lakeful of pure water for condensing, an abundant supply of cheap pulverized coal from lake barges which are unloaded by mechanical lifts—coal fed by gravity to mechanical stoker-blowers and burned to heat high pressure boilers. The Milwaukee bill to domestic consumers of 100 kilowatthours per month, according to the Federal Power Commission, is $3.75. In 1928 the bill for 90 kwhr for domestic service in Milwaukee was $3.59. Yet the electric refrigerator density in Wisconsin is only 20.9 per 100 domestic electric consumers, although the average purchasing power of the inhabitants of Milwaukee and the State ranks high in the nation. On the other hand, Florida has the highest average bill for 100 kwhr in the nation, $6.44, and nearly double the refrigerator density, 39.8, of Wisconsin, 20.9. Florida has a negro density of 29.4 per 100, while Wisconsin has one of 4 per 1000. Florida has higher water and fuel costs than other states in the Union. Thus, the municipally owned plant at Jacksonville charges domestic customers $7.00 per 100 kilowatthours for lighting, small appliances and refrigeration, according to the Federal Power Commission. The Jacksonville municipal plant found that it was compelled to increase its bill for 100 kwhr from $4.95 in 1928 to $7.00 at present. This rate, also according to the Federal Power Commission, is the sixth lowest in the state. Obviously, the relatively low normal July temperature in Wisconsin, 70° Fahrenheit, and the abundant supply of natural ice, explain the low refrigerator density in the state as compared with Florida, where the normal July temperature is 81.7° and natural local ice is non-existent.

My belief is that if rates in Wisconsin were cut in two, this would not furnish great stimulus to electric refrigerator sales. Reduction of electric rates for refrigeration in Jacksonville, however, would probably stimulate sales in that city, but not as much as would increased incomes and a July with 5° or 10° excess temperature over normal, or a substantial increase in the income of the lower income groups of electric consumers, such as day laborers, share-croppers and clerks. (See the four accompanying diagrams showing relation between the percentages of Federal income tax returns and refrigerator density—Figs. 4, 4A, AB, 4C, and Fig. 5.)

If the Floridans should install refrigerators as liberally as did citizens of

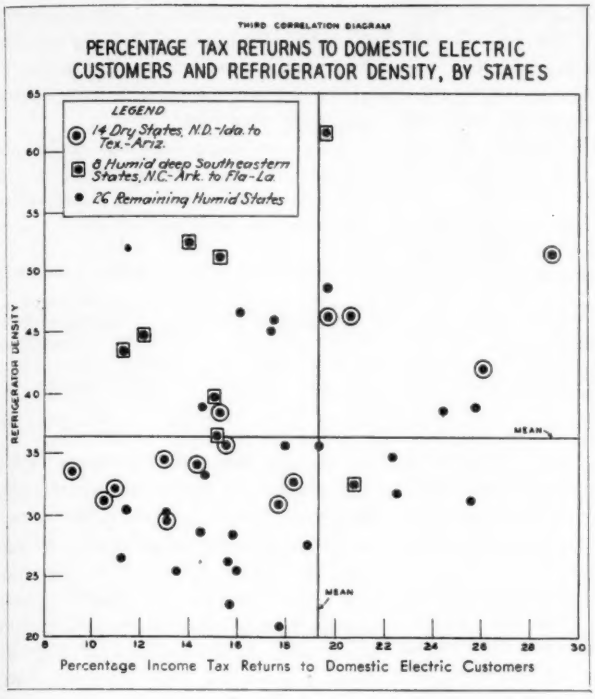

THIRD CORRELATION DIAGRAM
PERCENTAGE TAX RETURNS TO DOMESTIC ELECTRIC CUSTOMERS AND REFRIGERATOR DENSITY, BY STATES
LEGEND
14 Dry States, N.D.-Ida. to Tex.-Ariz.
8 Humid deep South eastern States, N.C.-Ark. to Fla.-La.
26 Remaining Humid States
REFRIGERATOR DENSITY
MEAN
Percentage Income Tax Returns to Domestic Electric Customers

Fig. 4

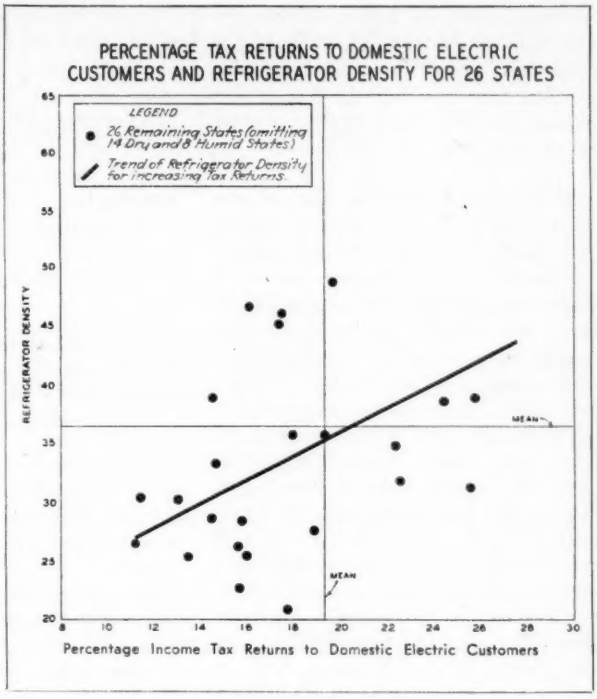

PERCENTAGE TAX RETURNS TO DOMESTIC ELECTRIC CUSTOMERS AND REFRIGERATOR DENSITY FOR 26 STATES
LEGEND
26 Remaining States (omitting 14 Dry and 8 Humid States)
Trend of Refrigerator Density for Increasing Tax Returns
REFRIGERATOR DENSITY
MEAN
Percentage Income Tax Returns to Domestic Electric Customers

Fig. 4-A

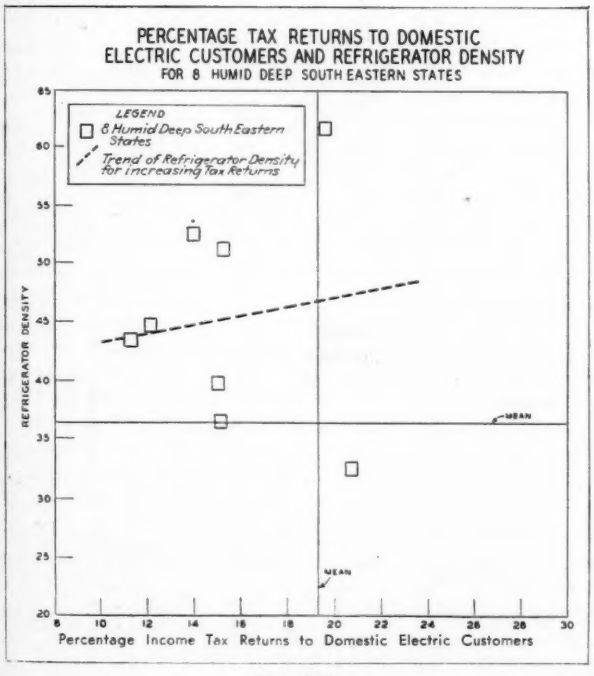

PERCENTAGE TAX RETURNS TO DOMESTIC ELECTRIC CUSTOMERS AND REFRIGERATOR DENSITY
FOR 8 HUMID DEEP SOUTH EASTERN STATES
LEGEND
8 Humid Deep South Eastern States
Trend of Refrigerator Density for Increasing Tax Returns
REFRIGERATOR DENSITY
MEAN
Percentage Income Tax Returns to Domestic Electric Customers

Fig. 4-B

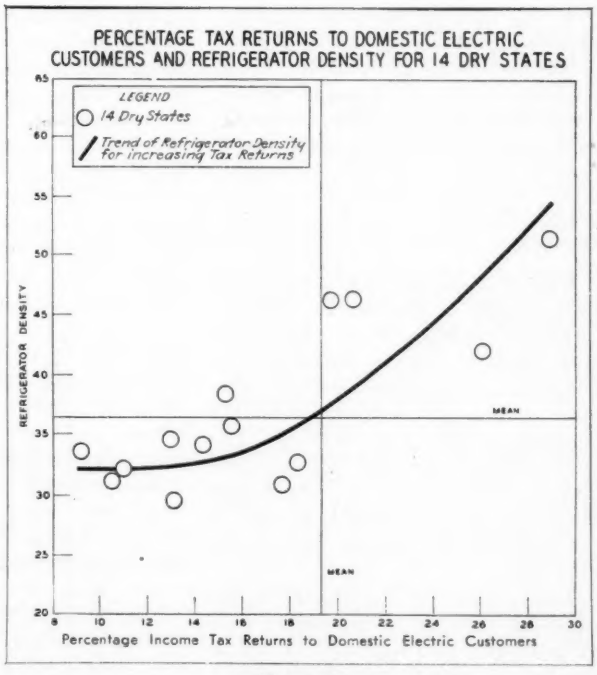

PERCENTAGE TAX RETURNS TO DOMESTIC ELECTRIC CUSTOMERS AND REFRIGERATOR DENSITY FOR 14 DRY STATES
LEGEND
14 Dry States
Trend of Refrigerator Density for Increasing Tax Returns
REFRIGERATOR DENSITY
MEAN
Percentage Income Tax Returns to Domestic Electric Customers

Fig. 4-C

Columbia, S. C., in 1933, then 60 per cent of families in the income group of $2,000-$2,999 would own refrigerators, nearly 80 per cent of the families in the group of $3,000-$6,999 and 100 per cent of the families in the income group receiving $7,000 and upward. (See Fig. 5.) In Columbia, S. C., in 1933 the bill for 100 kwhr was $7.65 higher than the present bill in Jacksonville. Yet Columbia, S. C., according to a U. S. Department Survey of 1933 had a refrigerator density of 27.3 per cent, the same as the density for the state.

In 1935 the refrigerator density for South Carolina had increased to 52.5 per cent, while the average bill for 100 kwhr had declined to $4.53. A reduction of rates by the municipal plant of Jacksonville from $7 per 100 kwhr, in effect in 1935, to the former rate of $4.95, in effect in 1928, would probably stimulate refrigerator sales. But whether

it is possible for the Jacksonville municipal plant to do this, under operating conditions in that city, without incurring a deficit and thus shift the cost of supporting the plant from electric consumers to taxpayers, I do not know.

* * *

If the variation in the costs of producing and distributing electric current, and therefore the rates charged domestic consumers, were inversely associated with summer temperatures—that is, the hotter the summers the lower the rates—then one, comparing the figures for state average bills for 100 kwhr and refrigerator density, might (mistakenly) conclude that low rates *cause* high refrigerator density. Such a conclusion would be no more tenable than a conclusion that high percentage density of negroes in the population *causes* high refrigerator density. As we have said, high correlation, inverse or direct, does not indicate any conclusion as to causation. That must be established by collateral reasoning.

The fact is that bills for electric energy are not inversely associated with summer temperatures. They are directly associated with temperatures. This is indicated by the following table:

34 Humid States	Average Bill	Temp.
20 cool to moderate (A and C)	$4.79	74°
14 Warm to hot (E and F)	4.95	79°

14 Dry States	Average Bill	Temp.
8 cool to warm (B)	$5.28	72°
6 hot states (D)	5.61	78°

This table indicates that in the hotter states, humid or dry, average bills for 100 kwhr are higher than in the cooler states. Bills are directly associated with temperatures—probably because it costs more to produce electricity under the conditions prevailing in the South. The table indicates also that bills are substantially higher in the dry states than in the humid states probably because of the high costs of producing electricity in dry states.

Let us, therefore, combine the groups of states probably having higher costs of producing electricity (B, D and F of Map 2) than the remaining groups of states (A, C, and E). We obtain the following result:

Binary Grouping	Average Bill	Average Temperature
26 states with lower costs (A. C, E)	$4.75	75°
22 states with higher costs (B, D, F)	5.27	76°

From this comparison we notice that the temperatures for the two sections of the United States average about the same, although the average bills differ substantially. We conclude that the higher bills are mainly associated with dryness, that is, lack of water, than with temperature.

For the same binary grouping of states average bills for 100 kwhr and average refrigerator density compare as follows:

Binary Grouping	Average Bill for 100 kwhr	Average Refrigerator Density
26 states with lower costs (A, C, E)	$4.75	33.8%
22 states with higher costs (B, D, F)	5.27	40.1%

Despite the higher average bills in the 22 states ($5.27), the refrigerator density for these states is 40.1 as compared with 33.8 per cent for the remaining 26 states.

We conclude that the amount of the bills for 100 kwhr, in actual practice, is not a significant factor in influencing the sales of electric refrigerators for the country as a whole, as compared with other factors, especially temperature.

High average bills are inversely associated with precipitation—the scarcity of 'round-the-year abundant water supplies, for steam plants and the inaccessibility of the dry sections to water transportation and cheap fuel.

This conclusion does not mean that we have ruled out other influences than temperature as stimulating or retarding the purchase and use of refrigerators among the states. Differences of average purchasing power of the families living in wired houses of the several states is certainly an influence, as indicated by our study of the purchase and use of refrigerators of families in nine income groups living in seven cities scattered over the United States (Fig. 5). This study reveals the dominant influence of purchasing power of families in a *given* city, humidity and temperature. The study shows, also, that, as *among these cities,* heat was the dominating influence, with precipitation playing a lesser role.

We do not know, of course, whether the distribution of incomes of the families canvassed for information in the seven cities is or is not an accurate sam-

(*Continued on page 476*)

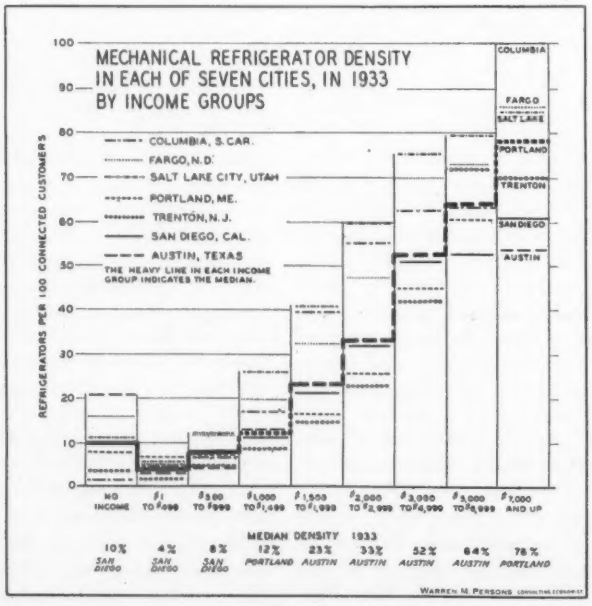


Fig. 5

Study of State Regulatory Laws Shows Criticism Unsupported by Facts

By Martin V. Callagy
Edison Electric Institute

THE report by the Federal Trade Commission[1] to the Senate concluding that "comparatively few States have adopted any thoroughgoing policy or system of utility regulation," minimized to such an extent the effectiveness of the present system of regulation, that an historical compilation and study of the State regulatory laws[2] was undertaken. The compilation and study covers a period of seventy-five years and sets forth the growth of the law by direct quotation from the session laws in each of the States. The greater part of one year was devoted to this task.

The regulatory laws in the States and Territories, with their impressive volume, decisive grants of power and liberality of provision, warrant the most enthusiastic commendation for the laws themselves and for the consideration and intensive application by the various legislative bodies to the problems involved. The continuous development of State regulatory law, progressively meeting each of the problems as they arose, has resulted in complete machinery for effective regulation.

On its completion, the compilation was thoroughly analyzed and the observations of critics of State Regulation were placed side by side with the enacted laws. In many instances the observations were so contrary to the actual situations, it became apparent that their authors may be placed in one or the other of three categories: (1) Those presenting statements who have not investigated to find authority for such statements. (2) Those that should know whereof they are speaking yet choose to disregard the dictates of their knowledge and (3) Those who have explored the subject to some extent, and conclude that State Regulation of Public Utilities has broken down and that some other system should be substituted.

Certain of these statements which tell of the existing regulation or lack of regulation, throughout the States, will be discussed with reference to their accuracy, when compared to the enacted measures taken from the Statute laws.

It has sometimes been asserted that niggardliness characterizes the legislative grants of power to regulate utilities, yet several of the States go far to refute any such assertion. Is it possible, for instance, accurately to delimit the boundary of power in so modest a delegation as this; "The Commission shall have and exercise all necessary power and authority to supervise, govern, regulate and control all . . . gas, electric light, heating and power . . . and other public utilities."[3]

Again, who would have the capacity to brief the extent of authority granted in a delegation to the Missouri Commission, which requires supervision over "all public utility corporations and persons whatsoever subject to the provisions of this Act as herein defined. And to such other and further extent, and to all such other and additional matter and things and in such further respects as may herein appear either expressly or impliedly."[4] The regulatory law of the State of Wyoming has a similar provision declaring that, "in addition to the powers herein specifically granted, the Commission shall have such implied . . . powers as may be necessary . . . effectively to carry out, perform and execute all the powers so granted."[5] The implied power in these typical illustrations is superimposed on page after page of minutely detailed grants of power which traverse all of the interlocking pathways considered necessary for effective regulation.

Nevertheless, all embracing provisions such as these, are dismissed in statements aimed to shatter confidence in the Regulatory Laws. For instance, consider this: "Public Utility Regulation as it exists generally today, has failed signally, I believe, to meet its public purposes,[6] or this, "so-called regulation of Public Utilities by State authorities is in most cases a failure . . . Regulation is poor at best."[7]

More recently, William T. Chantland [8] of the Federal Trade Commission testifying before a Senate Committee, commented that "the general history would indicate that, in many places, the State Regulation had never taken much hold." How could one so exposed to knowledge of Public Utility problems fail to know of the great and continuous progress made in perfecting State Regulation. In emphasis, Mr. Chantland's testimony continues, stating that "while Commissions may be given authority to regulate securities, the freedom with which utilities may determine the value of their own properties and set these values up on their books and financial statements is the real point involved, and until such matters are adequately controlled it can hardly be said that a State provides 'regulation.' "[9] This comment overlooks among other States, Ohio, which in 1913 enacted five detailed sections to guide the Commission in its valuation of utility property.[10]

In the book "Electrical Utilities," by William E. Mosher and others,[11] published in 1929, it requires only the turning of a few pages to discover the first of many errors. West Virginia, for instance, is exposed to critical comment for conferring upon its Commission jurisdiction "over water power companies alone."[12]

How futile then, was the time and effort expended by the legislature of that State,[13] to produce the following: "The jurisdiction of the Commission (Public Service Commission) shall extend to and include; (b) . . . pipe line

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[1] Chap. XII, p. 28, Vol. 73A. Summary Report to the Senate of the United States, January 28, 1935, pursuant to Senate Resolution No. 83, 70th Congress First Session.
[2] Includes all States, Territories, Possessions and the District of Columbia.
[3] Louisiana, Const. 1921, Art. 6, Sec. 4.
[4] Missouri, Sec. 16, p. 556, Laws of 1913.
[5] Wyoming, Sec. 26, Chap. 146, p. 120, Laws 1915.
[6] "Need for Quick-Fire Regulatory Commissions" John Bauer, P.U. Fortnightly, Dec. 7, 1933, p. 695.
[7] "The Ultimate Goal of Public Utility Regulation," Hon. George W. Norris, U. S. Senator from Nebraska, P.U. Fortnightly, March 6, 1930, p. 266.
[8] Hearing on "Public Utility Holding Company, Act of 1935" before Committee on Interstate Commerce, U. S. Senate, April 17, 1935, p. 117.
[9] Ibid., Note 8, p. 135.
[10] Laws 1913, p. 804, ss. 21, 22, 23, 24, 25—Sec. 21 amended, Laws 1915, p. 225.
[11] "Electrical Utilities," by Wm. E. Mosher and others—Harper & Bros. Publishers, 1929.
[12] Ibid., Note 11, p. 7.
[13] Sec. 3, Chap. 9, p. 53, Acts of 1913. Amended by Chap. 8, p. 40, Acts of 1915; Chap. 150, p. 559, Acts of 1921, Amendments did not change jurisdiction over Elec. & Gas Companies.

companies for the transportation of oil, gas or water; and (c) gas companies, electric lighting companies and municipalities furnishing gas or electricity for lighting, heating or power purposes; and (d) hydro-electric companies for the generation and transmission of light, heat or power . . ."

A table[14] in the same book, outlining for all of the States, the Regulation existing at that time, discloses that the Commission of Kansas has "no" power to regulate "accounting." Yet in 1911[15] Kansas had enacted a measure providing that "the Commission shall have authority to examine and audit all accounts, and all items shall be allocated to the accounts prescribed by the Commission." The State of Washington is similarly made an object of public condemnation because it does not require a Certificate of Convenience and Necessity,[16] even though the session laws of 1915[17] require that "No new public utility to render a service similar in character and location to the service rendered by any existing public utility in this State, shall be constructed, maintained or operated without first obtaining a certificate of public necessity and convenience."[18]

Similar instances from other authors might be cited, but to do so would not leave space for a discussion of a publication by the Federal Trade Commission,[19] wherein it is concluded that "comparatively few States have adopted any thoroughgoing policy or system of utility regulation." Some of the statements by which the Federal Trade Commission supports its finding, are either inaccurate or misleading and consequently make doubtful the report's value as a source of information. It is interesting also, to note that many of them are not complaints against state regulation of public utilities as such, but cover the whole field of corporate control, of interstate commerce, of the policy of permitting corporate directors to exercise discretion, and court and commission interpretations. Even technological progress is advanced as a contributing factor in the alleged present ills affecting State regulation.

To keep within the limits of this paper, it will be possible to present only a few of the observations made by the Federal Trade Commission.

The first, which, because of its location in the text,[20] must be taken as a generalization, is the complaint that "The Commission cannot prescribe a uniform system of accounts for the holding or affiliate company and thus an accurate determination of costs in the matter of charges imposed on the operating companies is a virtual impossibility."

The precision attainable by the use of a uniform system of accounts is recognized as being of considerable aid in a determination of costs, but it is hardly the only means available to accurately determine costs charged operating companies. Could not the same result be accomplished under the power conferred in Alabama[21] which makes it "the duty of the Commission to enforce . . . the provisions of this Act, and to that end it shall have in respect of holding companies, affiliated interests and utilities, all the authority and power to make investigations, inspections and examinations, to employ experts . . . to subpoena witnesses . . . and to issue orders and decrees as are now conferred upon it by law with respect to the affairs, management, operations, rates, services and practices of utilities." Under a law passed in 1920 the Commission was permitted to establish a system of accounts. On November 29, 1924, the Commission in Alabama adopted a uniform system of accounts for utilities recommended by the National Association of Railroad and Utilities Commissioners.

In Massachusetts, an accurate determination of costs in the matter of charges imposed on the operating companies appears to be amply attainable under a provision which permits the officers and employees of the department (Department of Public Utilities) "to examine the books, contracts, records, documents or memoranda . . . of any company . . . or of any affiliated company with respect to any . . . transactions or dealings direct or indirect, between such affiliated company and any company so subject, and for any examination so authorized, shall be entitled to full access to the subject matter thereof;[22] or the law in New Hampshire which demands that service contracts be filed with full information and makes it the duty of the Commission to investigate the contract, placing the burden on either the public utility or the affiliate, or both of them, to prove the reasonableness of the contract. Subsequently, if the Commission is not satisfied with the explanation, the contract may be disallowed in whole or in part.[23]

To the same end, but of different pattern, is a measure in the State of Oregon[24] giving power to the Commission over the budget expenditures of public utilities including all expenditures and "major contracts for the sale or purchase of equipment and as to all items . . . contemplating any payments to any person or corporation having an affiliated interest, for service, advice, auditing, associating, sponsoring, engineering, management, operating, financing legal or other services." Yearly the utility is to prepare a budget showing the amount of money considered necessary for the ensuing year's expenditures. These are to be filed with the Commissioner of Public Utilities who is to examine into the cost and to make an order approving or rejecting the amount.

A presentation of these sections from the laws of Oregon is not complete without the definition of "Public Utility," which includes ,"all corporations . . . individuals or association of individuals, parties to an oral or written agreement for the payment by a public utility for service, managerial, construction, engineering and financial fees, and having an affiliated interest . . . hereby are declared to be public utilities."[25]

Another charge of the Federal Trade Commission is that Washington makes no provision for the examination of books and records in connection with the cost of service contracts.[26] Such a statement invites an inquiry as to what power the legislature of the State of Washington thought it was delegating when in 1933[27] it emphasized that the department "shall not be required to approve any such contract or arrangement unless satisfactory proof is submitted . . . of the cost to the affiliated interest of rendering the services or of furnishing the property or service described herein." Proof of cost is not considered satisfactory "unless it includes the original (or verified copies) of the cost records and other relevant accounts of the affiliated interest, or such abstract or summary taken therefrom,

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[14] Table No. 1, p. 299—"Electrical Utilities," by William E. Mosher.
[15] Sec. 29, Chap. 238, p. 417, Laws of 1911.
[16] Ibid., Note No. 14, p. 300.
[17] Chap. 178, p. 603, Laws of 1915.
[18] "The term 'new Public Utility' . . . includes any public utility, whether municipally or privately owned, now or hereafter seeking to operate in this State for which no franchise or other authority to operate has been obtained, or any utility which desires to operate in a new territory not contemplated in any franchise or authority heretofore granted as well as any public utility which may commence operation without a franchise or which obtains its franchise after this Act takes effect." Chap. 178, p. 603, Laws of 1915.
[19] See note 1.
[20] F.T.C. Vol. 73A, p. 3.
[21] Sec. 10, Act No. 232, p. 233 Acts of 1932, Extra Session.
[22] Sec. 85, Chap. 164, p. 2157, G.L., inserted by Chap. 395, p. 464, Acts of 1930.
[23] Chap. 258a Title XXV P.L. inserted by Chap. 182, p. 274, Laws of 1933.
[24] Chap. 441, p. 815, Laws of 1933.
[25] Chap. 441, p. 827, Laws of 1933—Amending Sec. 61-201 Oregon Code 1930.
[26] F.T.C. Vol. 73A, p. 27.
[27] Chap. 152, p. 548, Laws of 1933.

as the department may deem adequate . . ." On the side of the operating company the department "may exclude from the accounts of such public service company any payment or compensation to an affiliated interest for any services rendered or property or service furnished as above described . . ." These latter citations, taken from the 1933 session laws of New Hampshire, Oregon and Washington (see notes 23, 24, 25, 27) may be subject to the objection by the Federal Trade Commission, that because of its investigation of electric and gas companies, the regulatory laws in these states were thus strengthened. However, to omit mention of the enactment of these laws in a report dated 1935, is misleading. The objection itself would be of doubtful worth since these enactments followed the normal development of regulatory law and changing technique.

Another startling misapprehension given prominence by the report is that "Thirty-two of the jurisdictions have some power, varying greatly in extent, from State to State, to regulate security issues by operating gas and electric corporations."[28] At random there is chosen for comparison a portion of the laws of three States covering the regulation of the security issues of electric and gas companies as follows:

OHIO

"A public utility . . . may; when authorized by order of the Commission, and not otherwise, issue (securities) . . . payable at periods of more than twelve months after date thereof, when necessary for the acquisition of property, the construction, completion, extension or improvement of its facilities or for the improvement or maintenance of its service, or for the reorganization or readjustment of its indebtedness and capitalization, or for the discharge or lawful refunding of its obligations, or for the reimbursement of moneys actually expended from income or from any other moneys in the treasury of the public utility . . . not secured or obtained from the issue of (securities) . . . of such public utility, within five years next prior to the filing of an application therefor as herein provided, or for any of the aforesaid purposes except maintenance of service and except replacements in cases where the applicant shall have kept its accounts and vouchers of such expenditures in such manner as to enable the Commission to ascertain the amount of money so expended and the purpose for which said expenditure was made." [29]

ILLINOIS

"Subject to . . . the order of the Commission . . . a public utility may issue (securities) . . . payable at periods of more than twelve months after the date . . . for the following purposes and no others, namely: For the acquisition of property, or for the construction, extension or improvement of or addition to its facilities, or for the discharge or lawful refunding of its obligations; or for the reimbursement of moneys actually expended from income or from any other moneys in the treasury of the public utility not directly or indirectly secured by or obtained from the issue of stocks or stock certificates, or bonds, notes or other evidences of indebtedness of such public utility, within five years next prior to the filing of an application with the Commission for the required authorization, for any of the aforesaid purposes except maintenance of service, replacements and substitutions in cases where the applicant shall have kept its accounts and vouchers for such expenditures in such manner as to enable the Commission to ascertain the amount of moneys so expended and the purposes for which such expenditures were made." [30]

ARIZONA

"A public service corporation may issue (securities) . . . payable at periods of more than twelve months after the date . . . for the following purposes . . . for the acquisition of property, or for the construction, completion, extension or improvement of its facilities, or for the improvement or maintenance of its service or for the discharge or lawful refunding of its obligations or for the reimbursement of moneys actually expended from income or from any other moneys in the treasury . . . not secured by or obtained from the issue of (securities) . . . within five years next prior to the filing of an application with the Commission for the required authorization, for any of the aforesaid purposes except maintenance of service and replacements, in cases where the applicant shall have kept its accounts and vouchers for such expenditures in such manner as to enable the Commission to ascertain the amount of moneys so expended and the purposes for which such expenditure was made." [31]

These sections are not evidence that among the jurisdictions, power to regulate security issues by operating gas and electric companies varies greatly in extent.

The State of North Carolina is represented by the Federal Trade Commission as requiring the filing of service contracts "without further substantial provision as to the jurisdiction intended to be conferred."[32] A measure enacted in North Carolina, in 1931[33] clearly goes further than the Federal Trade Commission's description in that it demands that "All public service corporations when requested by the corporation commission shall submit copies of contracts made with any person, firm or corporation classified as a holding, managing or operating company or selling service of any kind and the corporation commission shall have the right to disapprove any such contract, after hearing, if in its judgment it is found to be unjust or unreasonable and designed or entered into for the purpose of concealing, abstracting or dissipating the net earnings of the public service corporation receiving such services."

From these examples, which are by no means exhaustive, some idea may be gained as to how some of the current opinions concerning the regulation of public utilities by the States have developed and what has been no small factor in strengthening the belief that the Federal Government at Washington should have primary control over the affairs and activities of electric and gas companies.

These opinions and beliefs have been reached through disregard of all of the laws and what is most unfortunate, they are founded on misinformation. While a discussion of the regulatory laws as enacted cannot concern itself with the administration of the laws by those charged with the responsibility for their enforcement, yet the regulatory results obtained from the enforcement of the existing laws bear out the assertion that they are adequate. They need not be supplanted by any other system. When new conditions develop they can be modified or enlarged as necessary.

[28] F.T.C. Vol. 73A, p. 4.
[29] Sec. 56, Chap. 106, p. 549, Laws of 1911.
[30] Laws of 1921, p. 702.
[31] Sec. 52, Chap. 90, p. 495, Laws of 1912.
[32] F.T.C. Vol. 73A, p. 26.
[33] Chap. 455, p. 766, Laws of 1931—Amending Sec. 1037 of Chap. 21, p. 453, Con. Statutes N. C., 1919, Vol. 1.

J. B. Smith Honored for 50 Years of Service

J. Brodie Smith, Vice-President and General Manager of the Public Service Company of New Hampshire, and a pioneer in the field of electrical development, was honored at Manchester on Oct. 26 by hundreds of his fellow employees at a testimonial dinner marking 50 years of continuous service in the electric utility industry.

A parchment souvenir signed by 800 company employees was presented to him by A. R. Schiller, vice-president in charge of operations, and Mr. Smith was also the recipient of a 50-year service medal conferred by Walter S. Wyman, president of the New England Public Service Company. Tributes were voiced to Mr. Smith's achievements as a pioneer utility operator, his progressiveness, enterprise and good citizenship. Messages of congratulation were received from Owen D. Young, chairman of the General Electric board; C. W. Kellogg, president of the Edison Electric Institute, and other leaders of the industry.

Accident Prevention Committee Meeting

W. A. Buchanan, Chairman

THE fall meeting of the Accident Prevention Committee was held at the Lord Baltimore Hotel, in Baltimore, on Oct. 15 and 16. Several subject sponsorships were reported upon, most of which were progress reports, and plans were made for following up these subjects during the coming year.

Principles and Practices in Grounding:

Mr. I. W. Gross presented a final report. Copies of the printed report were distributed and the use of the material to subjects in which the Accident Prevention Committee is interested was discussed. The committee was anxious that wide publicity be given to this report so that it would receive extensive distribution. A special subcommittee which was appointed at the previous meeting to abstract from this report suitable material for use by the National Safety Council was continued under the chairmanship of Mr. H. J. Burton. It is planned to prepare from this report material that will be of interest to National Safety Council groups in the form of a Safe Practices Pamphlet and which will deal exclusively with the safety aspects of the grounding question.

Interlocks and Hold-Offs:

The application of interlock and hold-off procedure in the operating field of electric utilities was given careful consideration and it was decided that the joint subcommittee, which has been formed of representatives of the Accident Prevention Committee and the Electrical Equipment Committee to deal with this subject, should be continued and this subcommittee was urged to prepare a report that would be available for discussion at the next meeting. In the discussion of this subject it was brought out that a substantial proportion of the electric fatalities among company employees can be attributed to some defect or fault in interlock or hold-off practices. With this in mind it was hoped that something of a general nature could be prepared which would be used as a basis for individual companies in formulating a more detailed practice that would be applicable to the conditions under which each company operates.

Statistics:

Mr. C. R. Beardsley discussed the accident trend charts that had been prepared from statistical accident data collected for the committee. These data gave the trend in fatalities, lost time accidents, and days lost, for the electric light and power industry from 1923 to 1935, inclusive. It was pointed out that in 1929 the Accident Prevention Committee of the former N.E.L.A. had established objectives with regard to these three kinds of accidents which it was hoped might be reached by 1936. The actual data for the entire industry had been plotted on these charts and in practically all instances the results obtained have been better than the objective trends established in 1929. One of these charts gave the trend of days lost, lost time accidents, and fatalities, with the actual expenditures for construction over the period from 1923-1935, and it was found that as construction expenditures increased the accidents decreased. There was also a decrease in accidents as expenditures fell from 1930 to 1933. Since that time there has been an increase in expenditures for construction but the accident trend has continued downward.

Cause and Locus:

Mr. Beardsley reported on the data he had collected in this study. To date he has obtained these data for approximately 160,000 man years, including 94 fatalities, 2900 lost-time accidents, and 79,000 days lost. Inasmuch as these data were given in percentages it was felt that they could be applied without appreciable error to the employees for the entire industry. These data show the fatalities, lost-time accidents, and days lost, among the various groups of employees as well as among the various occupations of employees, and should prove of special value to other committees by pointing to those groups of employees and occupations where further safety efforts should be directed.

Low Voltage Hazards:

A report was made for Mr. E. W. Gorry, sponsor of this assignment, on a pamphlet that is about ready for publication entitled "Your Unseen Helper." This is a revision of a pamphlet published several years ago entitled "Common Sense." It is planned to have this pamphlet, which contains educational material aimed at avoiding electric shock and fire hazards in the home, published in large quantities and sold at low cost to permit wide distribution among domestic electric customers.

Electrified Fences:

There was considerable discussion on the subject of electrifying fences for the purpose of keeping live stock within fields and inclosures. A report that was made by Mr. C. C. Steck for Mr. H. J. Burton, called attention to an advertisement that had appeared in one of the technical publications in which it had been stated that the current on fences which are electrified through the interrupting device referred to in the advertisement, is interrupted so that the current is on for 5 seconds, and off for 5 seconds. Also in some of the advertising literature that had been called to the committee's atention, it was stated by those who are selling one of these devices, that no danger exists to persons as the current is reduced below the danger point and also is interrupted, eliminating the possibility of a person being unable to free themselves from the wire. In this connection it was brought out that a paper presented before the American Institute of Electrical Engineers, at its summer convention in 1936, entitled "Effect of Electric Shock on the Heart" had contained a statement that numerous tests on animals of several different species and in size comparable to a person, the maximum current of about 1/10 of an ampere for a duration of one second, or more, with a pathway between an arm and a leg constitutes the danger point. In view of this it was felt that the current and its duration on an electrified fence as given by the manufacturer of one of these devices, is approaching the danger point for serious electric shock.

No definite action was taken although the consensus of the committee was that this practice of electrifying fences in the manner referred to above should be given careful consideration from a safety point of view. The committee was very definitely opposed to the direct connection of a lighting circuit to a fence and urged that everything possible be done to point out this hazard to those who might attempt to make such a connection.

Traffic Hazards:

Mr. C. N. Rakestraw reported on the use of governors on automobiles. This subject was discussed with regard to the over-all safety involved in limiting speed by this means as a governor under some conditions may constitute a

hazard. Some who had investigated this practice were of the opinion that the use of governors for this purpose is the wrong approach to the problem. The committee is undertaking to follow the subject closely and be in a position to advise member companies with regard to the use of governors in company cars as a means of preventing traffic accidents.

Rubber Protective Equipment for Linemen:

A question was raised as to the advisability of modifying the practices of using rubber gloves. During the past two or three years it has become necessary to do an increasing amount of maintenance work on lines with voltages as high as approximately 7600 to ground. There was a discussion as to the safety involved in maintaining such circuits with rubber gloves as these circuits are frequently located in rural districts. The following subcommittee was appointed to study this problem: Messrs. M. F. Skinker, Brooklyn Edison Co.; I. W. Gross, American Gas & Electric Co.; and C. C. Steck, Consumers Power Co.

Tree Trimming:

Mr. Buchanan called the committee's attention to the proposed revision of the report on "Tree Trimming Practices," Publication 110, which was a joint report by the Accident Prevention Committee and the Overhead Systems Committee of the former N.E.L.A. It was brought out that since this report was published, about six years ago, practices and conditions may have changed. The Chairman explained that this matter had been under way for several months and that a definite set of proposed changes had been placed in the hands of the representative of this committee assigned to contact the Transmission and Distribution Committee. It was decided that this matter should be taken up with the Transmission and Distribution Committee promptly and the report revised if this is found to be necessary.

Several other subjects were discussed among these being: hazards at hydro-electric plants, CO_2 for extinguishing fires, and the proper methods for distributing Accident Prevention Committee publications.

Through the courtesy of the Philadelphia Electric Company, motion picture films were shown of some tests that had been made in Philadelphia in the early part of September, on two different types of oil fire extinguishing equipment for large outdoor electrical installations.

A feature that proved to be of interest at this meeting was an opportunity for the committee to witness a change-over of live circuits from an old pole to a new one. This was routine maintenance work done by one of the crews of the Consolidated Gas Electric Light & Power Company. The members of the committee who witnessed this work were impressed with the value of observing the methods of other companies and it was suggested that something similar to this be arranged at subsequent meetings, if possible.

The next meeting of the committee is planned for the last week in January in New York.

Electrical Equipment Committee Meeting

J. F. Fairman, Chairman

THE Fall meeting of the Electrical Equipment Committee was held at the Hotel Sagamore, Rochester, New York, Oct. 26-27. In addition to twenty-four members there were fifteen guests present at this meeting.

The organization of the committee, which has proven so successful during the past few years, is being continued with minor modifications which experience has shown to be desirable. The committee has five divisions under separate division chairmen responsible for the detailed organizing of the work. These are:

Apparatus and Design Division, *H. W. Eales, chairman.
Meter and Service Division, A. E. Silver, chairman.
Operation and Maintenance Division, E. S. Fields, chairman.
System Planning Division, S. M. Dean, chairman.
Utilization Division, J. H. Foote, chairman.

In addition, the committee has a Foreign Practice Group headed by Mr. A. H. Lawton which consists of the officers of the committee. This group maintains contact with engineers in about thirty foreign countries to obtain engineering information of interest to this committee and other committees of the Institute. The personnel of the committee is not subdivided into the various divisions. This arrangement permits each division chairman to call upon the member of the committee best qualified to sponsor a particular subject.

Mr. Sutherland reported that considerable progress was being made on the preparation of standards for oil circuit breakers. The AIEE Standard No. 19A was published in July, 1936, and is available from AIEE headquarters. Also, the AIEE Standards for Fuses above 600 volts was published last July. The ASA Standard for Relays, based upon the AIEE Standard No. 23, was submitted to the Sectional Committee for letter ballot in September. The specifications for outdoor oil circuit breakers, 15 kv and above, have been approved by the AEIC Committee on Electric Switching and Switchgear and have been referred to the EEI-AEIC-NEMA Joint Committee for general discussion, revision and approval. There has been considerable difficulty with bushings and a questionnaire has been sent out looking towards a detailed study of the bushing problem so that necessary modifications can be made to improve the reliability of these parts.

The problem connected with the possibility of fires from insulating oils is continuing to receive attention from the committee. The report form approved at the last meeting has been sent to all member companies and a number of reports containing valuable information for dealing with this problem have been received. These will be summarized and reported to the committee in the same general form as used for the apparatus trouble reports. The Philadelphia Electric Company recently made extensive tests of the effectiveness of various methods of combatting insulating oil fires. A colored moving picture of these tests was presented before the committee and clearly showed many of the features involved in the extinguishing of such fires.

The increase in use of flash welders is presenting a number of problems in connection with the rendering of satisfactory supply service. Equipment of this type is frequently arranged so that instantaneous demands are quite large and the kilowatthour consumption very small. In rendering service to this equipment care must be taken to see that the operation of the apparatus does not adversely affect the supply to other customers or to other apparatus of the same customer. In addition, the problem of metering

* Since the meeting Mr. H. L. Wallau has succeeded Mr. Eales.

both the demand and the energy consumed by such equipment was discussed. The committee will study this problem looking towards cooperation with the manufacturers to see that the overall economics of the supply and operation of the equipment are taken into consideration.

The Meter and Service Subcommittee reported that marked progress had been made over the last eight or ten years in the development of the various types of watthour meters and that, at the present time they believe that meters are available to satisfactorily meet all of the utility requirements. In view of this the subcommittee does not expect any radical meter developments within the next few years and is planning to devote its efforts to the improvement of service equipment, auxiliary apparatus, and to the general improvement in metering practice. The subcommittee also reported that progress was being made on the revision of the Handbook for Electrical Metermen but that this handbook would not be available in revised form for six to twelve months.

Mr. Eales reported that the presentation by the representatives of the Institute before the Federal Communication Commission last June petitioning for the allocation of radio frequencies for power system use had been favorably received at the open hearing but that as yet no decision had been rendered by the Commission on this subject. Papers discussing the power system communication requirements of the West Penn Power Company and the Southern Division of the Commonwealth and Southern System were presented by Mr. Fitch and Mr. Ketchum.

An interesting paper on System Modernization was presented by Mr. Greene of the Detroit Edison Company. This paper showed how, by rearrangement of circuit breakers and minor modifications of the buses, a more reliable and satisfactory system operating condition was obtained. In addition, modifications of generator bus leads have been made so as to eliminate troublesome heating. A number of modifications in the arrangement of ground plates and the grounding of building parts and cell structures have been made so as to provide more reliable ground fault protection throughout the station. Mr. Fairman presented a paper showing changes and modification to provide increased protection against bus faults which are being carried out by the Consolidated Edison Company in their principal stations.

The problem of network operation was thoroughly discussed. It was the consensus of opinion that networks should be so arranged and of such size that they could be energized from a single power source. The size of network which will meet this requirement will vary widely, depending upon the method of supply and the part that the network is of the total load.

Mr. Read of the Consolidated Edison Company presented a paper describing a coordinated plan for system development. This paper is published in this issue of the Bulletin.

Copies of the Brooklyn Market Survey were presented to all members of the committee. This survey gives the details of economic and living conditions of all sections of Brooklyn in a readily usable form. It was based on the Real Property Inventory which was made about a year ago by the New York City Housing Authority.

The next meeting of the committee is planned to be held early in February.

Transmission and Distribution Committee Meeting

P. H. Chase, Chairman

THE first meeting of the Transmission and Distribution Committee for the current administrative year was held at the Peabody Hotel, Memphis, Tenn., on Oct. 8, 9. Approximately two-thirds of the committee members were present, and in addition thirty-five engineers associated with power companies in several of the southeastern, southern, and western states attended.

The morning session of Oct. 8 was devoted to a paper and discussion on pine pole treating specifications. Mr. W. P. Arnold, Chemical Engineer of the Wood Preserving Corporation, presented a paper on the "Pressure Treatment of Pine Poles." He described the various processes through which poles pass from the time the tree is cut until it is removed from the treating cylinder. Stress was placed on the various methods of seasoning and conditioning poles prior to treatment and the need for taking climatic conditions, prior to treatment, into account. Mr. Arnold described the various methods of creosoting pine poles which are in common use today, and mentioned the kind and grade of creosote used as being an important factor.

Mr. J. A. Vaughan, Research Engineer of the Southern Wood Preserving Company, said that more rigid consumer requirements and a wide-spread increase in the cooperative study and knowledge of creosoted pine poles, by both the consumer and producer, have brought about some very definite improvements in the care, handling, treatment, and processing of southern pine poles during the past five years. Mr. Vaughan was of the opinion that the proper seasoning and conditioning of poles for treatment is the greatest problem which the producer faces, and that the securing of distribution and deep sapwood penetration is a relatively simple matter that should not be encumbered with minor processing details. Results and not operating details should be specified.

Mr. R. E. Meyers, of the International Creosoting and Construction Company, said that some interesting experiments and surprising results are being reported in the wood preserving industry. However, he suggested that those interested in pine pole treating specifications should avoid drawing too definite conclusions until some of the experimental data have been confirmed by experience. New methods and new preservatives require many years before results are positive and important lines should not be jeopardized by building them of poles on which experiments are being made.

Mr. Meyers said that the service records on many thousands of poles is demonstrating that the creosoting industry of today has the knowledge to produce creosoted pine poles that will give long life. In his opinion, the purchasing of poles on a strictly price basis will result in a sacrifice in the quality of the product. Pole purchasers were cautioned against placing too much reliance on a treating specification. Specifications can accomplish a great deal but even a "perfect specification" is not a cure-all, and can only be as good as the "pharmacist" who fills it.

Mr. S. J. Buckman, of the American Creosoting Company, mentioned several points in Mr. Arnold's paper that warranted further discussion. He felt that

undue emphasis had been placed on the decay hazard involved in the air-seasoning of poles. According to Mr. Buckman, such hazards are negligible when poles are properly handled and carefully observed throughout the various steps from the time the tree is cut in the woods until the thoroughly air-seasoned poles are ready for treatment. He was of the opinion that the application and intelligent use of existing knowledge on air-seasoning will insure a product by this method superior in quality to that obtained by any other methods now employed in preparing poles for treatment. With regard to the bleeding of poles, Mr. Buckman said that he agreed with Mr. Arnold that the condition of the wood before treatment is probably the most important of a number of factors that contribute to bleeding.

Mr. C. M. Tilley, General Superintendent of the Texas Creosoting Company, in discussing Mr. Arnold's paper, told briefly of the characteristics of pine poles, and pointed out that these make southern pine pole timber an ideal source of pole supply. He said that the difference between a comparatively worthless, but ultimately expensive pole, and a valuable, but ultimately low-cost pole, depends on the correct handling of the pole timber. Incorrect handling of raw materials includes exposure to infection in the woods or in the seasoning yards, injuring the strength by excessive heating during the conditioning process, inadequate penetration of the vulnerable sapwood, irregular penetration, incomplete diffusion, or by the use of non-toxic or adulterated preservatives. Mr. Tilley said that the production of the perfectly preserved pole is not only a matter of specification but primarily a matter of intent. The handling of semi-perishable poles requires the knowledge, experience, and work of an organization of sufficient size and with sufficient plant capacity to handle the job. He was of the opinion that the causes for pine pole failures had been definitely determined in most cases as being due to inefficient or adulterated preservation, insufficient penetration of sapwood, and unsound wood at the time of treatment.

Mr. C. S. McCallum, of the McCallum Inspection Company, spoke briefly of his experience from the inspection standpoint. He said he was not familiar with the economics involved, nor with pole costs, but favored 100 per cent sapwood penetration, which in his opinion is not difficult to obtain. Mr. McCallum spoke of the difficulty in applying the nigrosin dye test because this is not as exact as many think, although it is the best method available at present for determining sapwood penetration.

Several engineers from power companies discussed the pine pole problem from the standpoint of their experience in the purchase and use of this species of pole timber. This discussion brought out that many of the difficulties in securing satisfactory pine poles would disappear, or be materially lessened, through close cooperation between producer and consumer and an effort on the part of each to understand the other's problem.

During the afternoon session of Oct. 8, Mr. D. H. Rowland of the Locke Insulator Corporation gave an illustrated address on Porcelain for High Voltage Insulators. Mr. Rowland described the manufacture of porcelain and similar materials. The characteristics of porcelain were described and an interesting demonstration was given which showed the wide difference in the performance of porcelain when subject to tensile and compression stresses. He also gave an interesting explanation of the effect of the use of different kinds of glaze and showed that when the glaze is applied so that it is in tension, the glazed porcelain possesses a much greater resistance to impact than when porcelain is coated with a glaze that is in compression.

A paper was given by Mr. L. H. Winkler, Metallurgical Engineer, Bethlehem Steel Company, on the Bethanizing Process of Zinc Coating Steel Wire. This wire, commonly called bethanized wire, is, according to Mr. Winkler, an entirely new product. Essentially the process consists of applying a coating of zinc to the wire surface by an electrolytic method, although it should not be confused with the product of conventional electro-galvanizing methods. The bethanizing process so far has been used only for wire. It is claimed that a coating of zinc many times heavier than has heretofore been obtained on wire can be applied by this process. Mr. Winkler preceded his paper with a motion picture film showing the manufacture of steel from ore and the rolling and drawing of wire from billets.

The papers which were presented by Messrs. Rowland and Winkler were a part of a series which Mr. Mark Eldredge has planned as sponsor of the Transmission Group. Other papers of a similar nature but on different subjects will be given at subsequent meetings.

During the remainder of this afternoon session, the meeting was in charge of Mr. H. R. Searing, sponsor of the Underground Group. Two reports were presented for discussion. One of these was the Cable Operation Report for 1935, and was presented by Mr. W. F. Davidson. The other was the A. C. Network Operation Report for 1934 and 1935 and was presented by Mr. E. W. Oesterreich. Both of these reports were in preliminary draft form and were presented for discussion prior to their being published.

The essence of the material in the Cable Operation Report is set forth in twenty-eight items in the abstract, but those who wish to do so when the report is issued, may make a detailed study of a vast amount of statistical data and draw additional deductions which should be helpful in specific cases.

The A. C. Network Operation Report is published bi-ennially. It contains a compilation of data reported by sixty companies operating networks in ninety cities and localities. These data may be considered as being a good representation of practices and procedures since only fifteen companies, either operating or installing seventeen network areas, did not submit data for inclusion in this report. The total peak load served by the companies reporting data for this report showed an increase to 1,024,649 kv-a in 1935. This is an increase of 12.6 per cent over the 1934 load and 20.5 per cent over the 1933 load. The report also shows that the installed network transformer capacity is 17.35 per cent over the transformer capacity in service in 1933, while the load transformer capacity ratio showed an increase from 38.5 per cent to 39.5 per cent.

The forenoon session of Oct. 9 was devoted to a series of papers and discussions on capacitors. During this session the following papers were presented and discussed:

1. Economics of Shunt Condensers to Increase Distribution Line Capacity, by D. K. Blake, General Electric Company.
2. Series Resonance in Connection with Shunt Capacitors on Distribution Lines, by W. J. Lyman, Duquesne Light Co.
3. Series Capacitors for Distribution Economy—Specific Installation, by C. C. Moler and M. J. Urner, Potomac Edison Company.
4. Harmonic Resonance with Shunt Capacitors, by Merrill DeMerit, West Penn Power Company.

A general discussion followed the presentation of these papers, which

(*Continued on page 476*)

Research in Belgium on Wind Effect on Steel and Concrete Structures

A REPORT* has recently been issued by the Belgian Standards Association which describes a research project that has been undertaken to determine the effect of wind-loading on steel and concrete structures, including steel towers and overhead lines. The purpose of this research is to obtain information for use in effecting economies and improved design in types of structures that will be tested.

This research is to extend over a two-year period and will require an estimated expenditure of $12,000. Thirty-four different societies and organizations are expected to participate, including several branches of the Belgian government, railroad, electric supply, manufacturers, etc. The research will be supervised by a special commission under the chairmanship of Prof. L. Baes, of the University of Brussels.

This research will consist of two parts, one dealing with a study of Measurement of wind loading on flat panels of various sizes, at the University of Liege. The other, at the University of Brussels, will be conducted on small models placed in a wind tunnel and on the study of wind forces on full size structures.

The experimental work on the power line will be done on a line about 1640 ft. in length consisting of three steel towers approximately 100 ft. in height and spaced 820 ft. apart. These have been built at Zeebrugge on the North Sea. A novel feature of these experiments is the erection of the center tower on a special "floating" foundation. The vertical components of wind forces will be recorded by four electric dynamometers while the horizontal components are measured by six dynamometers of elastic deformation type. Movements of the base of the tower when not opposed by the horizontal dynamometers are measured in accordance by a pantograph of five times amplification. At the present time the Zeebrugge station is studying the wind loading on the tower only. Later, wires will be strung between the Zeebrugge towers.

Further details regarding this experimental work may be obtained from the Association Belge de Standardization, 63, Rue Ducale, Brussels, Belgium.

*This abstract has been made from a translation of the report, by Mr. B. J. Barmack, Commonwealth Edison Co., Chicago.

SALES—ELECTRIC REFRIGERATORS

(Household Models Only)

MONTH OF SEPTEMBER AND FIRST NINE MONTHS OF 1936-1935

	Month of September 1936	Month of September 1935	Month of August 1936	First Nine Months 1936	First Nine Months 1935
Total United States	80,050	53,622	106,975	1,833,682	1,423,483
Maine	71	207	285	6,978	7,637
New Hampshire	267	263	80	5,970	5,495
Vermont	(74)	118	216	4,286	3,404
Massachusetts	3,594	2,669	4,514	71,325	59,596
Rhode Island	386	347	745	9,139	7,620
Connecticut	807	1,075	1,851	31,070	23,209
Total New England	5,051	4,679	7,691	128,768	106,961
New York	17,501	12,628	18,431	210,162	170,105
New Jersey	4,712	2,634	4,623	77,848	61,658
Pennsylvania	8,807	3,760	8,768	168,782	112,585
Total Middle Atlantic	31,020	19,022	31,822	456,792	344,348
Ohio	5,354	2,967	6,242	120,497	87,352
Indiana	1,567	857	2,500	52,013	36,946
Illinois	3,274	2,358	5,226	134,840	105,516
Michigan	3,706	1,824	5,355	90,305	60,211
Wisconsin	654	547	1,497	30,834	24,604
Total East North Central	14,555	8,553	20,820	428,489	314,629
Minnesota	608	704	1,129	25,468	20,808
Iowa	529	342	711	28,227	24,555
Missouri	2,269	1,174	3,147	58,538	44,297
North Dakota	59	62	54	2,918	4,004
South Dakota	(62)	69	133	4,754	5,094
Nebraska	176	233	544	16,158	16,228
Kansas	789	249	563	21,792	18,993
Total West North Central	4,368	2,833	6,281	157,855	133,979
Delaware	19	101	271	3,551	3,109
Maryland	907	596	1,290	20,078	20,979
District of Columbia	1,104	467	744	17,739	11,357
Virginia	1,203	552	1,662	29,145	21,345
West Virginia	193	329	247	23,167	15,584
North Carolina	554	316	1,400	35,265	25,327
South Carolina	260	265	1,180	17,148	12,630
Georgia	585	725	864	30,705	27,620
Florida	3,543	1,645	2,799	24,829	22,129
Total South Atlantic	8,368	4,996	10,457	201,627	160,080
Kentucky	257	435	1,522	24,667	16,839
Tennessee	1,277	893	1,162	28,229	24,659
Alabama	802	415	858	20,867	21,929
Mississippi	290	167	1,047	10,589	7,275
Total East South Central	2,626	1,910	4,589	84,352	70,702
Arkansas	298	203	333	10,871	10,263
Louisiana	1,144	430	355	18,668	14,126
Oklahoma	630	181	542	18,667	16,942
Texas	2,881	1,640	4,642	75,590	61,563
Total West South Central	4,953	2,454	5,872	123,796	102,894
Montana	260	208	477	8,708	6,304
Idaho	231	176	96	8,912	7,067
Wyoming	51	62	48	2,833	2,417
Colorado	662	171	609	13,602	11,546
New Mexico	135	48	140	3,667	3,264
Arizona	129	125	123	5,773	5,633
Utah	400	176	300	11,048	7,385
Nevada	182	51	211	2,667	1,803
Total Mountain	2,050	1,017	2,004	57,210	45,419
Washington	1,071	1,120	2,140	30,716	21,488
Oregon	500	529	1,048	19,362	14,386
California	5,488	6,509	14,251	144,715	108,597
Total Pacific	7,059	8,158	17,439	194,793	144,471

This summary includes adjustment figures reported by several companies which do not represent their actual September sales but are corrections to be applied to their first eight months' totals to give their correct total apportionment among the various states for nine months.

(Figures based on report issued by the National Electrical Manufacturers' Association.)

POWER SALES ITEMS

AIR CONDITIONING

"When to Use Steam Jet Units for Air Conditioning," by M. A. Nelson. *Heating and Ventilating Magazine*, September, 1936, p. 27. The Industrial Press, Publishers, 148 Lafayette Street, New York City.

The French Building and the British Building of Radio City are both cooled by steam jet refrigeration.

"Air Conditioning Makes Severe Demands on Water Supply and Disposal Systems," *Heating, Piping and Air Conditioning*, September, 1936, p. 491. Keeney Publishing Company, Publishers, 6 North Michigan Avenue, Chicago, Ill.

Increased demands on water supply and disposal facilities because of condensing water requirements of the fast growing number of air conditioning installations have caused serious consideration to be given to the problem in several cities.

"Gas for Air Conditioning," by Floyd W. Parsons. *Gas Age-Record*, September 12, 1936, p. 291. Robbins Publishing Company, Publishers, 9 East 38th Street, New York City.

In this article Mr. Parsons sees a big future for gas in the air conditioning field. This business will be gained by the use of automatic gas engine driven compressors.

"Guaranteed Results Sell Attic Ventilation," by George W. Pattillo, Houston Lighting & Power Co. *Electrical South*, September, 1936, p. 17. W. R. C. Smith Publishing Company, Publishers, Grant Building, Atlanta, Georgia.

This article tells of success achieved by "Guaranteed Results" in selling attic ventilation. The power company does not sell, but cooperates by advertising, furnishing prospects, and assisting in closing of sales. The local dealers agreed to remove any installations which were not satisfactory. In order to avoid dissatisfaction due to improper operation the power company undertook to educate the customer in the proper use of the apparatus. So far no installations have been removed.

"A Study of Various Combination Air Conditioning Systems," by L. Ourusoff. *Gas Age-Record*, October 3, 1936, p. 367. Robbins Publishing Company, Publishers, 9 East 38th Street, New York City.

Silica gel system. Silica gel with water cooling. Silica gel with compression cooling. Pure compression with gas engine. Utilization of heat from engine jacket.

"1200 Tons Refrigeration Required for Air Conditioning Kansas City Auditorium," by Wm. L. Cassell. Heating, Piping & Air Conditioning, September, 1936, p. 479. Keeney Publishing Company, Publishers, 6 North Michigan Avenue, Chicago, Ill.

Control of temperature and air circulation.

DIESEL ENGINES

"Diesel Engineering Instruction," by F. Hechler. *Mechanical Engineering*, October, 1936, p. 635. American Society of Mechanical Engineers, Publishers, 29 West 39th Street, New York City.

"Academy Gardens Reports on One Year of Operation," by Stewart Hoskins of Percival Robert Moses, Sidney R. Klein and Associates, New York City. *Diesel Power*, September, 1936, p. 573. Diesel Publications, Inc., Publishers, 192 Lexington Avenue, New York City.

Operating and unit costs and operating and revenue data for the first year are summarized. Principal equipment is listed.

"Air Conditioning Increases Business—Diesel Engines Reduce Costs at Ye Eat Shoppe." *Diesel Power*, September, 1936, p. 576. Diesel Publications, Inc., Publishers, 192 Lexington Avenue, New York City.

Short article on installation of automatic Diesel plant when air conditioning increased the power bill unreasonably.

"Volco Wire Company Installs Diesel Plant." *Diesel Power*, September, 1936, p. 578. Diesel Publications, Inc., Publishers, 192 Lexington Avenue, New York City.

Brief description of the Diesel plant installed to lower the utility rate of less than 1½c. kwhr. Investigations of other plants proved that a duplicate set and a permanent station operator were unnecessary.

ELECTRIC DRIVE

"Electric Drives in Grain Elevators," by S. M. Smith. *Electrical News and Engineering*, September 1, 1936, p. 22. Hugh C. MacLean Publications, Ltd., Publishers, 347 Adelaide Street West, Toronto 2, Ontario, Canada.

ELECTRIC FURNACES

"Electric Heat Treating Furnaces in Steel Mills," by A. N. Otis. *Iron Age*, September 17, 1936, p. 51. Iron-Age Publishing Company, 239 West 39th Street, New York City.

"New Uses of Electric Furnace Brazing Process," by H. M. Webber. *General Electric Review*, August, 1936, pp. 381-387. General Electric Company, Publishers, 1 River Road, Schenectady, New York.

A discussion of recent applications of the electric brazing process, together with a description of various types of brazing furnaces.

"Buys Electric Furnace for Treating Airplane Parts," by E. P. Dean. *Electrical World*, September 26, 1936, p. 51. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Brief description of the most up-to-date heat-treating plant of its kind on the Pacific Coast.

ELECTRIC HEATING

"Industrial Electric Heating," by N. R. Stansel. *General Electric Review*, September, 1936, p. 440. General Electric Company, Publishers, 1 River Road, Schenectady, New York.

Inductive heating.

ELECTRIC MOTORS

"A 7000-HP Direct-Current Motor for a Reversing Mill," by J. S. Newton. *Electric Journal*, September, 1936, p. 401. Electric Journal, Publishers, 530 Fernando Street, Pittsburgh, Pa.

"Induction Motors Provide Flexible Drive." *Electrical World*, September 26, 1936, p. 49. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Short article on modernization of motor drive using induction motors.

EQUIPMENT APPLICATION

"Electrical Equipment in Building Construction," by George H. Hall, Consulting Engineer, New York. *Electrical World*, September 12, 1936, p. 48. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Review of electrical equipment with their application as used in building construction at less cost and in a shorter time.

METAL MELTING

"The Application of Electric Heating Units to Soft Metal Melting," by R. M. Cherry. *General Electric Review*, July, 1936, pp. 344-347. General Electric Company, Publishers, 1 River Road, Schenectady, New York.

In this article the author describes the construction of immersion units, method of installation, advantages of immersion units, and gives a typical example of estimating the requirements of an immersion heater installation.

POWER FACTOR

"Double Economy in Power-Factor Correction," by L. A. Hunt. *Electrical News and Engineering*, September 15, 1936, p. 34. Hugh C. MacLean Publications, Ltd., Publishers, 347 Adelaide Street West, Toronto 2, Ontario, Canada.

Rountree Chocolate Factory puts wattless current to work without increasing power bill.

STEAM AND PURCHASED POWER

"Steam for Butter." *Power*, November, 1936, pp. 600-602. McGraw-Hill Publishing Company, Inc., Publishers, 330 West 42nd Street, New York City.

Facts and figures on the power plant of the American Butter Company, Kansas City, Mo., which supplies power services to produce 6,500,000 lb. of butter per year, as well as hog and poultry feed. Refrigerating compressors are steam driven, but all other power is purchased.

TOPPING PLANTS

" 'Topping' Extension to the Omaha Steam Plant of the Nebraska Power Company," by L. Elliott. *Combustion*, September, 1936, p. 20. Combustion Publishing Company, Inc., Publishers, 200 Madison Avenue, New York City.

The turbine will supply steam to an existing 200-lb. 500 F 15,000-kw. unit, giving a combined unit of approximately 27,000 kw. capacity.

Influence on Refrigerator Sales

(Continued from page 466)

ple of the actual distribution for the entire population of the city. Nor do we know whether the city refrigerator densities, based upon the figures for the seven cities, reflect the refrigerator densities of the states in which the cities are located. The available evidence, in fact, is contrary to these assumptions.

Summary of Conclusions

What makes people buy refrigerators? The relative importance of factors, in order of importance, are these:

1. July temperatures, particularly maximum temperatures, increase sales steadily as July temperatures rise to average maxima of 85° or 90°. Higher temperatures do not appear to add to the buying stimulus. That is to say, at average maxima of 85° or 90° prospective customers are fully saturated with heat.

2. Normal precipitation of 25 inches or more annually, freezing winter temperatures and average maximum July temperatures of 80° or less greatly decrease refrigerator buying. All summer resort states, without exception, are in the lowest electric refrigerator density group.

3. States with low precipitation (below 25 inches) have high electric refrigerator density.

4. *Within a given temperature and precipitation area* the strongest influence on refrigerator purchases is family income. Substantial buying (ranging from 20 to 60 per cent of electric customers in different areas) begins in the income class $2,000-$2,999 and increases to 50 or 100 per cent in the income class of $7,000 and up.

5. The electric consumers of high average income states buy more refrigerators than those of lower income states *if the states be first divided into heat and humidity groups.*

6. Electric energy rates are, for the most part, of little effect on refrigerator purchases. There are, however, two exceptions:

(a) In the 14 dry states from North Dakota-Idaho south to Texas-Arizona, high energy rates are associated with high refrigerator densities (Fig. 3-B) and (b) in the eight humid deep southeastern states from South Carolina - Florida to Louisiana - Arkansas, low energy rates are associated with high refrigerator densities (Fig. 3-A).

7. Correct sales quotas cannot be set up for the sales of electric refrigerators without considering summer temperatures, annual rainfall and winter temperatures.

8. It would be interesting to ascertain the relationship between (a) electric refrigerator density and (b) intensity of sales and merchandising. Which is most important in effecting sales, the July sun or concentrated sales efforts?

CONVENTIONS AND MEETINGS

NOVEMBER

10-13 National Association of Railroad and Utilities Commissioners, Atlantic City, N. J.

11-13 American Institute of Chemical Engineers, Baltimore, Md.

30 American Society of Mechanical Engineers, New York, N. Y.

30 Prime Movers Committee, EEI Headquarters, New York, N. Y.

30 National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York, N. Y.

DECEMBER

1 Prime Movers Committee, EEI Headquarters, New York, N. Y.

1- 4 National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York, N. Y.

1- 4 American Society of Mechanical Engineers, New York, N. Y.

JANUARY

21-22 Transmission and Distribution Committee, Philadelphia, Pa.

25-29 American Institute of Electrical Engineers, New York, N. Y.

FEBRUARY

8- 9 Electrical Equipment Committee, Cincinnati, Ohio.

14-18 National Electrical Manufacturers Association, New York, N. Y.

APRIL

26-28 Chamber of Commerce of the U. S. A., Washington, D. C.

MAY

10-14 National Fire Protection Association, Chicago, Ill.

24-27 National Association of Purchasing Agents, Pittsburgh, Pa.

Transmission and Distribution Committee Meeting

(Continued from page 473)

showed that this means of increasing the capacity and improving the efficiency of distribution systems is receiving thoughtful consideration by many operating companies.

The afternoon session of Oct. 9 was open only to committee members and engineers of power companies and was divided into two parts. One part was presided over by Mr. H. P. Seelye, Sponsor of the Standards and Specifications Group. During this part of the session, progress reports were made concerning specifications for pine poles, distribution line insulators, primary fuses and cutouts, and pole line hardware. The other part of this session was presided over by Mr. W. F. Davidson, Sponsor of the Plant Coordination Group, and reports were made on joint-use specifications, Principles and Practices Governing Inductive Coordination between the Association of American Railroads and E. E. I. member companies, sodium vapor lamps, inductive coordination problems in rural electrification, mercury arc rectifiers, and distribution operating records.

Through the courtesy of the Memphis Power and Light Company, arrangements were made for three trips on Saturday, Oct. 10. One of these was an all-day trip to a pole treating plant at Jackson, Tenn.; another was a combination trip to the pole-treating plant at Jackson, Tenn., and to Wilson Dam and Wheeler Dam on the Tennessee River; while the third was an all-day trip to Pickwick Landing Dam, which was under construction, and to Wilson and Wheeler Dams. A number of those attending this meeting took advantage of the opportunity to make these interesting trips.

The next meeting of the committee is tentatively planned to be held in Philadelphia, during the week of Jan. 25, 1937.

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